
REVISION OF THE INFRAGENERIC CLASSIFICATION OF *LOBELIA* L. (CAMPANULACEAE: LOBELIOIDEAE)

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ABSTRACT

The infrageneric classification of the cosmopolitan genus *Lobelia* L. (Campanulaceae) is revised via synthesis of diverse phenotypic data. The 415 species are divided among 18 sections (numbers of included species are given in parentheses): *Lobelia* sect. *Delostemon* (E. Wimm.) J. Murata (44); *Lobelia* sect. *Holopogon* Benth. (14); *Lobelia* sect. *Colensoa* (Hook. f.) J. Murata (1); *Lobelia* sect. *Cryptostemon* (E. Wimm.) J. Murata (10); *Lobelia* sect. *Stenotium* (C. Presl) Lammers (144); *Lobelia* sect. *Lobelia* (22); *Lobelia* sect. *Hypsela* (C. Presl) Lammers (43); *Lobelia* sect. *Mezleriopsis* Lammers, sect. nov. (7); *Lobelia* sect. *Jasionopsis* Lammers, sect. nov. (1); *Lobelia* sect. *Tylomium* (C. Presl) Benth. (38); *Lobelia* sect. *Homochilus* A. DC. (5); *Lobelia* sect. *Tupa* (G. Don) Benth. (4); *Lobelia* sect. *Trimeris* (C. Presl) A. DC. (1); *Lobelia* sect. *Speirema* (Hook. f. & Thomson) Lammers (5); *Lobelia* sect. *Plagiobotrys* Lammers (1); *Lobelia* sect. *Rhynchoptalum* (Fresen.) Benth. (61); *Lobelia* sect. *Revolutella* E. Wimm. (9); and *Lobelia* sect. *Galeatella* E. Wimm. (5). In addition, *Monopsis* Salisb. sect. *Xanthomeria* (C. Presl) Lammers, comb. nov., is validated to provide the correct name for *Monopsis* sect. *Parastranthus* (G. Don) E. Wimm.

Key words: Campanulaceae, classification, *Hypsela*, infrageneric, *Isotoma*, *Lobelia*, Lobelioideae, *Monopsis*, nomenclature, *Pratia*, typification.

“This whole genus would richly reward any botanist for an analytical investigation.”

—Lindley (1826)

Large polytypic genera pose special problems for taxonomists. To simply place 200 or more species into a genus without some indication of relationships among them is most unsatisfying. We know that all of these species did not radiate simultaneously from some ancestor; we know that some will have more character states in common with one another than they will have with other congeners. In order to convey our understanding of these relationships and similarities, additional taxonomic structure is required (Stuessy, 2009).

Lobelia L. is a perfect example. With 415 species (Argent et al., 2007; Lammers, 2007a, 2007b; Heenan et al., 2008; Knox et al., 2008a; Senterre & Castillo-Campos, 2008), it is the second largest of the 84 genera in Campanulaceae Juss. and the largest of the 29 genera in subfamily Lobelioideae Burnett (Lammers, 2007a). Its members are extremely diverse in growth form, habit, reproductive strategies, floral structure and color, pollination syndromes, fruit type, seed morphology, and chromosome number (Lammers, 2007c).

Some believe that science is best served by dividing polytypic genera into smaller, more homogeneous genera, particularly when the genus is a “residual concept” rather than an explicitly diagnosed taxon (King & Robinson, 1987). Irrespective of the merits of this approach, I hesitate to follow it at this time because of the heavy cost it exacts due to our binomial system of species nomenclature. Each change in generic assignment means that a new binomial must be coined or an old one resurrected. This creates confusion for users of our classifications as well as increased workloads for those who index nomenclatural novelties and maintain electronic databases. Applying this approach to *Lobelia* would result in as many as 393 of the 415 recognized species taking a different and, in most cases, new binomial (Lammers, 2007a). Furthermore, dismemberment of *Lobelia* would be premature. At least three laboratories (Koopman & Ayers, 2005; Knox et al., 2006, 2008a, 2008b; Antonelli, 2008) are actively generating DNA sequence data that would be extremely useful in such an undertaking; however, these studies are as yet rather preliminary; large pieces of lobelioid diversity have yet to be included. If the world must be inconvenienced by the appearance of nearly 400 unfamiliar names, it should

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only be done on the soundest evidentiary basis possible.

Nonetheless, there is a very real need for a revision of the existing classification of *Lobelia*. The two classifications in current use (Wimmer, 1943, 1953, 1968; Murata, 1995) each have serious shortcomings. The former is based on too few (often single) characters and features a confusing multiplicity of ranks and unranked taxa. The latter is a marked improvement, far more holistic and synthetic in its use of characters and far simpler in structure. However, it does not assign every species to a taxon, instead merely listing exemplars for each. More seriously, some names in both classifications violate the *International Code of Botanical Nomenclature* (ICBN; McNeill et al., 2006).

As noted above, a wealth of molecular data pertinent to this genus is on the horizon. New data such as this can be used to test an existing classification in the same way that the results of an experiment can be used to test a hypothesis (Cracraft, 1978; Gilmartin, 1986; Donoghue, 1987; LaDuke, 1987). To do so, however, the existing classification must be sound, representing a synthesis of all available data. As this is not the case for *Lobelia*, a revised classification is promulgated here. At the very least, its availability will keep those crafting the next classification from falling prey to the incompleteness and nomenclatural mistakes that plagued earlier efforts.

TAXONOMIC HISTORY

The generic name *Lobelia* originated with Plumier (1703), who coined the polynomial *L. frutescens, portulacae folia* for the littoral shrub known today as *Scaevola plumieri* (L.) Vahl (Goodeniaceae). Linnaeus (1753, 1754) took up this generic name (giving the original species the binomial *L. plumieri* L.), but added to it numerous species today assigned to Campanulaceae, which had been assigned by pre-Linnaean authors to the genera *Dortmanna* O. O. Rudbeck ex Hill, *Laurentia* Adans., and *Rapuntium* Mill. As such, Linnaeus's *Lobelia* was at a minimum biphyletic, incorporating species of two disparate families.

Various contemporaries (e.g., Miller, 1754, 1768; Adanson, 1763) objected to this broad circumscription and restricted *Lobelia* to the original goodeniaceous species, resurrecting various pre-Linnaean generic names for the campanulaceous interlopers. Miller (1754) thereby created a later homonym of the Linnaean *Lobelia*. A second later homonym was created by Presl (1836) when he inexplicably

excluded all of the original Linnaean species from *Lobelia* and left only species described later, the majority assigned today to *Siphocampylus* Pohl; for *Lobelia* in the Linnaean sense, he used the name *Rapuntium*.

Eventually, Linnaeus (1771) admitted that his circumscription was unnatural. However, rather than render *Lobelia* goodeniaceous, as others had done, he segregated *L. plumieri* as a new genus, *Scaevola* L., thereby creating a thoroughly campanulaceous *Lobelia*. De Candolle's (1839) endorsement of this action ensured its acceptance by all but a handful of recalcitrants (e.g., Kuntze, 1891, 1898; Post & Kuntze, 1903; Safford, 1905).

The first to promulgate an infrageneric classification of the genus was Presl (1836), who divided his *Rapuntium* into *Rapuntium* sect. *Xanthomeria* C. Presl, *Rapuntium* sect. *Stenotium* C. Presl, and *Rapuntium* sect. *Sphaerangium* C. Presl. Endlicher's (1838) classification of *Lobelia* was identical except for his failure to indicate the rank of his infrageneric taxa (Brizicky, 1969) and the segregation of *L. dortmanna* L. as a fourth taxon. De Candolle (1839) removed *Rapuntium* sect. *Xanthomeria* from *Lobelia* as the genus *Parastranthus* G. Don. The two remaining Preslian sections he largely combined as *Lobelia* sect. *Rapuntium* (Mill.) A. DC., though a few species of *Rapuntium* sect. *Sphaerangium* were segregated as *Lobelia* sect. *Homochilus* A. DC.; the monotypic genus *Trimeris* C. Presl was subsumed as a third section. Heynhold (1840) created 11 unranked infrageneric taxa in *Lobelia* by subordinating previously recognized genera (*Centropogon* C. Presl, *Dobrowskyia* C. Presl, *Enchysia* C. Presl, *Isolobus* A. DC., *Laurentia*, *Monopsis* Salisb., *Parastranthus*, *Piddingtonia* A. DC., *Pratia* Gaudich., *Siphocampylus*, and *Tupa* G. Don). His twelfth taxon, representing *Lobelia* in the sense of Endlicher (1838) and de Candolle (1839), was denoted as "*Lobelia genuina*."

Bentham's (1876) treatment likewise featured an expanded circumscription, though not so broad as Heynhold's (1840). The three sections of de Candolle (1839) were retained (with *Lobelia* sect. *Rapuntium* renamed *Lobelia* sect. *Eulobelia* Benth.). Two sections erected by Bentham previously (*Lobelia* sect. *Hemipogon* Benth. and *Lobelia* sect. *Holopogon* Benth.) and three genera recognized by earlier authors (creating *Lobelia* sect. *Tupa* (G. Don.) Benth., *Lobelia* sect. *Tylomium* (C. Presl) Benth., and *Lobelia* sect. *Rhynchoptalum* (Fresen.) Benth.) were added to this. Schönland's (1889) classification was very similar, with the addition of two more former genera as *Lobelia* sect. *Mezleria* (C. Presl)

Schönl. and *Lobelia* sect. *Isolobus* (A. DC.) C. B. Clarke, and the merger of *Lobelia* sect. *Tylomium* and *Lobelia* sect. *Rhynchoptalum* under the former name.

Like Presl (1836), Post and Kuntze (1903) insisted that *Rapuntium* was the correct name for the genus. Their classification differed from that of Schönland (1889) in the segregation of *Rapuntium* sect. *Trematocarpus* Kuntze from *Rapuntium* sect. *Tupa* (G. Don) Kuntze, and *Rapuntium* sect. *Haynaldia* Kuntze from *Rapuntium* sect. *Tylomium* (C. Presl) Kuntze; inclusion of the genera *Grammatotheca* C. Presl, *Monopsis*, and *Parastranthus* as sections; and the renaming of *Lobelia* sect. *Eulobelia* and *Lobelia* sect. *Hemipogon* as *Rapuntium* sect. *Cardinalis* Kuntze and *Rapuntium* sect. *Dortmanna* (O. O. Rudbeck ex Hill) Kuntze, respectively.

The most highly structured classification of *Lobelia* was that of Wimmer (1943, 1953, 1968), which was derived from Schönland's (1889) and was the first since de Candolle (1839) to assign every recognized species to an infrageneric taxon. A major innovation was the apportionment of the sections among three subgenera: *Lobelia* subg. *Lagotis* E. Wimm. (later corrected to *Lobelia* subg. *Lobelia*), *Lobelia* subg. *Mezleria* (C. Presl) E. Wimm., and *Lobelia* subg. *Tupa* (G. Don) E. Wimm. *Lobelia* subg. *Lobelia* comprised two sections, *Lobelia* sect. *Hemipogon* (later corrected to *Lobelia* sect. *Lobelia*) and *Lobelia* sect. *Holopogon*. The former was divided into *Lobelia* subsect. *Trachyspermae* E. Wimm. (which should have been corrected to *Lobelia* subsect. *Lobelia*) and *Lobelia* subsect. *Leiospermae* E. Wimm., the latter into *Lobelia* subsect. *Cryptostemon* E. Wimm. and *Lobelia* subsect. *Delostemon* E. Wimm. *Lobelia* subg. *Mezleria* likewise comprised two sections, *Lobelia* sect. *Eumezleria* E. Wimm. (later corrected to *Lobelia* sect. *Mezleria*) and *Lobelia* sect. *Paramezleria* E. Wimm. *Lobelia* subg. *Tupa* comprised six sections: *Lobelia* sect. *Isolobus*, *Lobelia* sect. *Eutupa* A. DC. ex E. Wimm. (later corrected to *Lobelia* sect. *Tupa*), *Lobelia* sect. *Rhynchoptalum*, *Lobelia* sect. *Homochilus*, *Lobelia* sect. *Revolutella* E. Wimm., and *Lobelia* sect. *Galeatella* E. Wimm.; of these, *Lobelia* sect. *Tupa* was divided into *Lobelia* subsect. *Primanae* E. Wimm. and *Lobelia* subsect. *Haynaldianae* E. Wimm. Some of the subsections were divided into greges and subgreges. Wimmer also used the symbol “§” to denote “kleinere Gruppen (ohne Rang)” (1953: 479), in one case within a grex, in others within a subsection.

Many of the taxa in Wimmer's (1943, 1953, 1968) classification were defined by single charac-

ters. For example, *Lobelia* subg. *Lobelia* and *Lobelia* subg. *Mezleria* were distinguished from *Lobelia* subg. *Tupa* solely on habit: “saepe annuae, debiles vel fruticuli graciles” in the former versus “robustae, suffrutices vel frutices” in the latter (with the proviso that *Lobelia* subg. *Tupa* sect. *Isolobus* actually resembled the other two subgenera in habit). Similarly, *Lobelia* sect. *Holopogon* and *Lobelia* sect. *Lobelia* were distinguished solely on the basis of whether all five or only the ventral pair of anthers were bearded at the apex. One's confidence in the naturalness of a classification that embodies this sort of single-feature characterization is frankly quite low.

In this regard, the classification of Murata (1995) represented a marked improvement because of his attempt to find multiple correlations among functionally unrelated characters (cf. Stuessy, 2009). Specific changes were: (1) narrowing the circumscription of *Lobelia* sect. *Lobelia* so that it encompassed only *Lobelia* subsect. *Lobelia*; (2) removal of *Lobelia* subsect. *Leiospermae* from *Lobelia* sect. *Lobelia* and recognition of most of it as *Lobelia* sect. *Heyneana* J. Murata; (3) treatment of the remainder of *Lobelia* subsect. *Leiospermae* as *Lobelia* sect. *Dioicae* (E. Wimm.) J. Murata in *Lobelia* subg. *Mezleria*; (4) division of *Lobelia* sect. *Holopogon* into *Lobelia* sect. *Cryptostemon* (E. Wimm.) J. Murata and *Lobelia* sect. *Delostemon* (E. Wimm.) J. Murata; (5) addition of *Pratia* sect. *Pratia* to *Lobelia* sect. *Mezleria* (which thus became *Lobelia* sect. *Pratia* (Gaudich.) J. Murata); (6) placement of *Lobelia* sect. *Isolobus* in *Lobelia* subg. *Mezleria* instead of *Lobelia* subg. *Tupa*; (7) addition of *Pratia* sect. *Colensoa* (Hook. f.) Baill. to *Lobelia* subg. *Tupa* as *Lobelia* sect. *Colensoa* (Hook. f.) J. Murata; and (8) removal of all non-Chilean species of *Lobelia* sect. *Tupa* to *Lobelia* sect. *Colensoa*. No ranks lower than section were used.

Despite its improvements, there were still shortcomings. Only types and a few other exemplars were assigned to each section; one is left to guess where the remainder belong. (This is complicated by the fact that a few exemplars were said to belong to one section in the text and a different one in the accompanying table.) Additionally, some of the names used violate provisions of the ICBN. For example, at sectional rank *Hemipogon* has priority over *Pratia*, while *Stenotium* and *Microcentron* have priority over *Heyneana*.

CHARACTERS AND THEIR STATES

Phenotypic traits of the Campanulaceae have been described in detail by Lammers (2007c). In this

section, some of the more complex characters that have proven particularly efficacious in crafting the revised classification of *Lobelia* are explained and discussed, to ensure that the descriptions provided below are understood fully.

HABIT

Lobelia is extremely heterogeneous in overall body plan, more so than any other genus in the family. First, the various species form a continuum from fully herbaceous plants that undergo no secondary growth or lignification, to those that become lignified in their basal portions, to those that amass considerable wood throughout their axes, building trees up to 9 m tall.

Second, relative stoutness of the stems varies considerably, irrespective of the presence or absence of lignification. In many species, the stems are no more than 5 mm in diameter, even when some secondary growth takes place; such stems are here termed gracile. Stems of greater girth, which often are woody to some degree, are termed robust. Very robust stems with a broad parenchymatous or hollow pith are termed pachycaul (the gracile and less robust stems are contrasted as leptocaul).

Third, the longevity of individual plants varies. Most species, whether herbaceous or woody, are iteroparous (polycarpic). Among species that are semelparous (monocarpic), those with gracile stems are typically annual or in a few cases biennial, while those with robust and especially pachycaul stems are pliestesial.

Fourth, almost every life form (Raunkiaer, 1934) is represented. Hemicryptophytes are perhaps the commonest, followed by geophytes and chamaephytes; these all may be considered “herbaceous perennials.” The remaining herbaceous species are therophytes. Woody plants include both nanophanerophytes (subshrubs, shrubs, and treelets) and phanerophytes (large shrubs and trees). Most species are terrestrial, but a few are facultatively or obligately hydrophytic.

INFLORESCENCE

The basic reproductive unit in *Lobelia* is a solitary pedicellate flower in the axil of a leaf, typically a leaf near the apex of the stem. The pedicel frequently bears a pair of opposite or subopposite bracteoles, typically in the proximal two thirds; in many species, however, these are altogether lacking.

When multiple flowers are produced (by far the norm), the sequence of bloom is always acropetal

(centripetal). The stem is characteristically anauxotelic, i.e., incapable of resuming vegetative growth after flowering ceases. If the leaves that subtend the flowers differ in neither size nor shape from ordinary foliage, the plants are said to bear solitary axillary flowers. More commonly, these distal floral leaves are smaller and shaped differently from the foliage below, i.e., they are bracts. As a result, the flowers are borne in a terminal raceme.

Sometimes, the transition from foliage to bracts is very gradual; such “foliose racemes” may be mistaken for a stem with solitary axillary flowers, particularly when anthesis begins. Other times, the change from foliage to bracts is quite abrupt and a distinct peduncle may separate the distalmost leaf from the basal bract. In such “bracteate racemes,” the demarcation of the inflorescence is quite obvious. Variation in pedicel length can cause a raceme to resemble a spike (uniformly short pedicels), a corymb (pedicel length decreasing acropetally), or an umbel (rachis condensed). In some species, branches arise near the base of the raceme, creating a panicle. In two species, the bracteate racemes become pseudoaxillary via sympodial growth, i.e., though terminal, they are soon overtopped by vegetative growth from an adjacent axillary bud.

COROLLA

As with habit, the appearance of the corolla varies enormously. First, the five lobes may all be relatively uniform in size, shape, and connation, i.e., monomorphic. Alternatively, the three ventral lobes may be larger, broader, and connate for a greater distance than the dorsal pair, i.e., the lobes are dimorphic. In one small group of the latter, however, the central ventral lobe is conspicuously larger and wider than the two flanking it.

Second, angular orientation of the lobes around the flower’s axis varies; this is best understood by mentally superimposing a clockface on the flower as seen in face view. In species with dimorphic lobes, the corolla is bilabiate: the two dorsal lobes more or less parallel one another in an upright posture, while the ventral three spread out as a trifid lip. In other words, the dorsal lobes are oriented at 12 o’clock or at 11 and 1 o’clock, while the ventral lobes fall at 4, 6, and 8 o’clock. In species with monomorphic lobes, greater variation is possible. Some species have a bilabiate corolla as described above, though the distinction between the dorsal and ventral lip may not be as pronounced as it is when the lobes are dimorphic. Far more common is for the dorsal lobes to arise in a slightly more ventral

position, e.g., at 10 and 2 o'clock, making the symmetry appear more radial than bilateral; this type of corolla is here termed sub-bilabiate. Some bilabiate or sub-bilabiate corollas feature a distinct palate or a pair of variously prominent gibbosities on the ventral lobes at their mouth. Finally, all five lobes may be displaced ventrally in a single plane, i.e., they all fall between 4 and 8 o'clock; this is termed a unilabiate corolla.

Third, the connate portion of the petals (the corolla tube) varies in several features. The tube may be straight or nearly so, or curved ventrally to a greater or lesser extent. When straight or nearly so, the axis of the corolla tube typically forms a line with the axis of the hypanthium; in one small group, however, the former is deflected ventrally at an acute angle from the latter. In nearly all members of the genus, the dorsal side is cleft from its mouth almost to its base; in a few species, this cleft only extends partway to the base or is entirely absent. In some species, small window-like openings (fenestrations) develop laterally toward the base. In other species, a slender long or short nectar spur develops at the base of the corolla tube; this distorts the hypanthium, displacing the ventral pair of calyx lobes to the distal end of the spur.

Fourth, the proportion of the petal that is connate varies. The three ventral petals may be more connate than the dorsal pair, or all five petals may be equally connate, forming lobes of approximately the same length. The former condition is typically expressed as a trifid ventral lip and a pair of dorsal lobes that are separate from it for about half their length. In a few species, the dorsal pair is separate from the ventral lip for nearly its entire length. In the case of petals that are more or less equally connate throughout, they may be fused for half their length or less, forming lobes about as long as the tube or longer; or for more than three quarters of their length, forming lobes that are one quarter as long as the tube or less.

Finally, there is a great deal of variation in the pigmentation of the corolla. Most species are some shade of blue or purple, often with undertones of rose or mauve, though hues from the opposite end of the spectrum are common, including red, pink, magenta, orange, and yellow. Chlorophyllous (green) corollas are more common than one might suppose in a genus with conspicuous zygomorphic sympetalous flowers. Unpigmented (white) corollas are not uncommon, both as the norm for a species and as occasional mutants in species with pigmented flowers. Corollas showing two or even three colors are not uncommon. Common patterns are blue or purple with white and/

or yellow at the mouth, and a red tube with yellow and/or orange lobes.

ANTHERS

Lobelioideae possess a specialized method of proterandrous secondary pollen presentation (Erbar & Leins, 1989, 1995; Leins & Erbar, 1990). An important component of this is the trichomes at the orifice of the ventrally oblique anther tube, which function as a lever for the discharge of pollen. In many species, the apices of the anthers are bearded with tufts of hairs, either on all five anthers or just the ventral pair. These hairs are filiform, except in one species where they are flattened. In some species, a single long narrowly triangular flattened or awnlike bristle adorns the apex of each ventral anther; this is sometimes supplemented by a tuft of filiform hairs. In a few species, the orifice of the anther tube is nude, with neither hairs nor bristles.

SEEDS

Murata (1992) studied in detail the morphology of the seed coat (testa) in Lobelioideae and relied heavily on these data in crafting his classification of *Lobelia* (Murata, 1995). Five distinct patterns were recognized; only the surface aspects are summarized here, although each type is also characterized by distinctive features of its internal structure. The testa of type A seeds is reticulate, with the cells longer than wide and the radial walls irregularly elevated above its surface, giving the seed a roughened appearance. The testa of type B seeds is also reticulate, but the cells are more or less isodiametric and the walls project but slightly; these seeds are sometimes said to have a pitted appearance. Type E seeds are identical except for the lack of a cuticle. The testa of type C seeds is likewise reticulate with less prominent cell walls, but the cells are so elongate (even more so than in type A) that such seeds are often described as striate-reticulate in appearance. In type D seeds, the cells have become so elongate that they are very difficult to recognize; the overall appearance is striate or almost smooth.

In addition to testal patterns, seeds in *Lobelia* vary in shape as seen in transverse section; the commonest cross section is terete or nearly so; some of these become rather irregularly angular, cuboidal, or quadrate. A significant number of species have distinctly trigonous seeds, while others are strongly compressed (lenticular); the last in many cases

develop a partial or complete wing around the circumference.

CHROMOSOME NUMBER

Published chromosome numbers for *Lobelia* were summarized and discussed by Lammers (1993); additions have been made by several authors (Knox & Kowal, 1993; Stace & James, 1996; Ruas et al., 2001; Murray et al., 2004) and a few overlooked counts discovered (Lepper, 1979, 1980, 1982). The base chromosome number (x) for *Lobelia* is readily interpreted as seven, making the numerous plants with $2n = 14$ diploid. From this base, several levels of polyploidy have evolved, including tetraploid ($2n = 28$), hexaploid ($2n = 42$), octoploid ($2n = 56$), decaploid ($2n = 70$), endecaploid ($2n = 77$), dodecaploid ($2n = 84$), tridecaploid ($2n = 91$), and icosaploid ($2n = 140$). Additional numbers ($2n = 12, 16, 18, 20, 22, 24, 26, 38$) are interpreted as aneuploid, although allopolyploidy cannot be ruled out.

TAXONOMIC TREATMENT

Only those names validated by citing *Lobelia* as a synonym are listed as synonyms of the generic name per se. All other effectively published supraspecific names referable to the genus will be found under the section to which its type belongs. This includes the following names at generic rank: *Calcaratolobelia* Wilbur, *Colensoa* Hook. f., *Dortmanna*, *Enchysia*, *Euhaynaldia* Borbás, *Galeatella* (E. Wimm.) O. Deg. & I. Deg., *Haynaldia* Kanitz, *Holostigma* G. Don, *Holostigmateia* Rchb., *Hypsela* C. Presl, *Isolobus*, *Neowimmeria* O. Deg. & I. Deg., *Petro-marula* Belli ex Nieuwl. & Lunell, *Piddingtonia*, *Pratia*, *Rapuntium*, *Rhynchoptalum* Fresen., *Speir-ema* Hook. f. & Thomson, *Trimeris*, *Tupa*, and *Tylomium* C. Presl. An index to sectional assignments for all species included within *Lobelia* by Lammers (2007a) is provided in Appendix 1.

***Lobelia* L., Sp. Pl. 2: 929. 1753. *Cardinalis* Riv. ex Fabr., Enum. 122. 1759, nom. illeg. sub Art. 52.1. *Laurentia* Adans., Fam. Pl. 2: 134, 568. 1763, nom. illeg. sub Art. 52.1 (Brummitt, 2000; but cf. Lammers, 1997). *Mecoschistum* Dulac, Fl. Hautes-Pyrénées 459. 1867, nom. illeg. sub Art. 52.1. TYPE [designated by Hitchcock & M. L. Green in Anon., Nomencl. Prop. Brit. Bot. 184. 1929]: *Lobelia cardinalis* L. [Under Art. 10.5(b), this supercedes the earlier choice of *Lobelia dortmanna* L. (Ill. Fl. N. U.S. (Britton & Brown) 3: 29. 1913) (cf. McNeill et al., 1987).]**

Plants perennial (hemicryptophytes, geophytes, chamaephytes, nanophanerophytes, or phanerophytes) or annual (rarely biennial), sometimes pliestesial, 0.02–9 m tall, terrestrial or rarely hydrophytic or epiphytic. Roots fibrous or rarely tuberous, adventitious or the primary root persisting as a tap root. Stems gracile or robust, the latter sometimes pachycaul, herbaceous, suffruticose, or woody, prostrate, decumbent, ascending, or erect, simple to much branched, sometimes rhizomatous, stoloniferous, and/or apically or basally rosulate; latex acrid, viscous, white or rarely colored. Leaves alternate, simple, exstipulate, dillenid, dorsiventral (rarely centric), pinnately (rarely palmately) veined, sessile or petiolate; margin commonly variously toothed, less often entire, rarely lobed or parted. Flowers tetracyclic, perfect (rarely imperfect and the plants then dioecious or gynodioecious), zoophilous, chasmogamous with a specialized method of protandrous secondary pollen presentation, resupinate, epigynous, zygomorphic, pedicellate, solitary in the axils of the upper leaves or these reduced in size, creating a terminal (very rarely pseudoaxillary) foliose or bracteate anauxotelic (very rarely auxotelic) raceme, sometimes branching (paniculate), rarely spikelike, corymbose, or subumbellate in appearance; pedicels bibracteolate or ebracteolate, very rarely oligobracteolate. Calyx synsepalous, radially (rarely bilaterally) symmetric, adnate to the ovary, forming an appendicular hypanthium; lobes 5 (very rarely 4), valvate, typically triangular, rarely with a reflexed auriculate appendage in each sinus. Corolla early-sympetalous, typically for half or more of its length, bilaterally (rarely almost radially) symmetric, bilabiate or sub-bilabiate with 2 dorsal and 3 ventral lobes or unilabiate with 5 ventral lobes, typically some shade of blue or purple, often with undertones of rose or mauve, less often red, pink, magenta, orange, yellow, green, or white, concolorous or subtly (less often sharply) bicolorous or tricolorous, very rarely with a slender long or short ventral nectar spur; tube straight to arcuate, typically cleft almost to its base on the dorsal side, rarely only partway or even entire, sometimes laterally fenestrate; lobes valvate, monomorphic, or dimorphic with the ventral 3 larger, sometimes with a palate or a pair of gibbosities on the ventral lip at the mouth of the tube. Stamens 5, antisepalous, inserted on rim of hypanthium or at very base of corolla tube, connate distally, forming an exserted (rarely included) and dorsally deflected staminal column free from (rarely adnate to) the corolla tube; anthers tetrasporangiate, dithecal, basifixed, introrsely dehiscent by longitudinal slits, the dorsal

3 longer than the ventral 2, forming a ventrally oblique tube occluded at the orifice, the ventral pair or all 5 anthers bearded at apex with dense tufts of filiform hairs, the ventral pair sometimes with a single apical bristle each, or rarely all anthers nude at apex; pollen grains tricolporate or tricolpate, prolate, ellipsoid, psilate, binucleate or trinucleate when shed. Gynoecium syncarpous, bilocular; ovary completely or partially inferior (rarely almost superior through reduction of the hypanthium); placentae axile, large; ovules numerous, small, anatropous, unitegmic, tenuinucellate; style solitary, slender, terete, with a ring of stiff white hairs below the apex; stigma bilobed, the lobes appressed and nonreceptive as the style grows through the anther tube, pushing out pollen, after which the stigmas spread and become receptive. Fruit a capsule, loculicidally dehiscent by an apical pair of triangular valves, or less often a fleshy or dry berry. Seeds small, numerous, black, brown, or golden, terete, trigonous, or lenticular (the last sometimes winged), rarely irregularly angular, cuboidal, or quadrate; testa reticulate or striate; embryo small, straight; endosperm copious, cellular, oily or rarely starchy, its formation ab initio cellular.

Chromosome numbers. $2n = 12, 14, 16, 18, 20, 22, 24, 26, 28, 38, 42, 56, 70, 77, 84, 91, 140$ (Lepper, 1979, 1980, 1982; Knox & Kowal, 1993; Lammers, 1993; Stace & James, 1996; Ruas et al., 2001; Murray et al., 2004).

Distribution. Almost cosmopolitan, native to (1) the New World, from southern Canada to Tierra del Fuego, including the Greater and Lesser Antilles, Turks and Caicos Islands, the Bahamas, Galápagos Islands, Juan Fernández Island, and the Falkland Islands; (2) northern and western Europe, from Scandinavia and northern Russia to the Iberian Peninsula, including the Faroe Islands and the British Isles; (3) Africa, in Morocco and from Senegal to Sudan and South Africa, including the Azores, Madeira, St. Helena, Madagascar, and the Mascarene Islands; (4) southern and eastern Asia, from Oman to the Russian Far East south to Indonesia and Papua New Guinea, including the Kuril Islands, Japan, the Bonin Islands, the Ryukyu Islands, Taiwan, Hainan, the Philippines, the Andaman and Nicobar Islands, and Sri Lanka; (5) Australia and New Zealand, including Norfolk, Kermadec, and Chatham islands; and (6) the central Pacific, specifically Pitcairn, Rapa, and the Hawaiian Islands. The New World and Africa are each home to over 37% of the species; 12% of the species are found in Asia, 10% in

Australia and New Zealand, and 3% in the Hawaiian Islands (Lammers, 2007a). The two species native to Europe are interlopers from boreal North America (*Lobelia dortmanna*) and northwestern Africa (*L. urens* L.), while the single species native to Pitcairn and Rapa (*L. anceps* L. f.) is circumaustral, extending from southern Africa through Madagascar, Australia, Norfolk Island, New Zealand, Chatham Island, and Kermadec Island to Juan Fernández Island and Chile.

Etymology. The name honors Flemish herbalist Matthias de L'Obel (1538–1616), physician to William of Orange and James I of England, who in his *Stirpium Adversaria Nova* (1571) argued for the necessity of exacting observation in botany and medicine.

Discussion. The circumscription of *Lobelia* embraced here is that used in the recent accounts of the family in the *World Checklist and Bibliography* series (Lammers, 2007a) and the encyclopedic *Families and Genera of Vascular Plants* (Lammers, 2007c). This is nearly identical to that advocated by Schönland (1889) and Wimmer (1943, 1953, 1968); the sole difference is the inclusion of species previously assigned to *Pratia* (Moeliono, 1960; Adams, 1972; Wilbur, 1991; Murata, 1995; Lammers, 1998) and *Hypsela* (Chiapella, 1996; Lammers, 1999a). A key to distinguish the genus from the rest of the family was provided by Lammers (2007c).

This revised classification departs from its predecessors (Wimmer, 1943, 1953, 1968; Murata, 1995) in the abandonment of subgenera; the sole rank utilized here is that of section. To recognize two or three subgenera would suggest some fundamental bifurcation or trifurcation very early in the evolutionary history of the genus. The molecular phylogenies published thus far do not reveal any such event, and it does not seem likely that such a pattern will emerge with further sampling. The overall structure revealed by the most comprehensive of these (Knox et al., 2006; Antonelli, 2008) is of numerous reasonably well-defined clades with varying degrees of relatedness to one another. My opinion is that the best way to translate this sort of evolutionary structure into a traditional formal classification is to recognize multiple coordinate sections. In crafting them, I have placed primary emphasis on multiple correlations of phenotypic characters and on biogeographical coherence. To the extent that phylogenetic information is available, I have used it to inform and temper my decisions.

KEY TO THE SECTIONS OF *LOBELIA*

- 1a. Flowers in nodding pseudoaxillary inflorescences.
 - 2a. Stems erect to ascending; inflorescence corymbose, the rachis condensed; pedicels oligobraceolate; corolla 30–45 mm long; anthers nude; seeds ovoid, striate (Murata type D); plants of New Zealand 3. *Lobelia* sect. *Colensoa*
 - 2b. Stems scrambling or sprawling; inflorescence racemose, the rachis elongate; pedicels bibracteolate below the middle; corolla 10–28 mm long; anthers with tufts of flattened hairs at apices of all five; seeds cuboidal or quadrate, reticulate (Murata type B); plants of Malesia 15. *Lobelia* sect. *Plagiobotrys*
- 1b. Flowers in erect terminal inflorescences or solitary in the axils of the upper leaves.
 - 3a. Corolla lobes one fourth as long as the tube or less.
 - 4a. Corolla sub-bilabiate or bilabiate (rarely unilabiate), the tube straight or nearly so, the lobes free at apex; diploid plants of southern North America and northern South America 11. *Lobelia* sect. *Homochilus*
 - 4b. Corolla unilabiate, the tube strongly arcuate, the lobes coherent at apex; hexaploid plants of central Chile 12. *Lobelia* sect. *Tupa*
 - 3b. Corolla lobes equaling or longer than the tube.
 - 5a. Anthers with a single elongate bristle at the apex of each of the ventral pairs (sometimes supplemented by tufts of shorter hairs) or very rarely nude; seeds typically reticulate (Murata type B), less often striate (Murata type D); plants primarily of the Southern Hemisphere, not represented in North America.
 - 6a. Flowers in a corymbose or subumbellate raceme; corolla unilabiate, pink or white with transverse red or purple markings on lobes; plants of South Africa 9. *Lobelia* sect. *Jasionopsis*
 - 6b. Flowers solitary in the axils of leaves, rarely in a loose raceme; corolla sub-bilabiate, various shades of blue, purple, pink, or white.
 - 7a. Plants commonly perennial; stems commonly prostrate; seed coat reticulate (Murata type B); plants of Asia, Australasia, and southern South America 7. *Lobelia* sect. *Hypsela*
 - 7b. Plants commonly annual; stems commonly decumbent; seed coat striate (Murata type D); plants of southern Africa 8. *Lobelia* sect. *Mezleriopsis*
 - 5b. Anthers with tufts of filiform hairs at apex of the ventral pair or all five (rarely all nude); seeds striate (Murata type D) or striate-reticulate (Murata type C), if reticulate (Murata types A and E); native to North America.
 - 8a. Seeds reticulate (Murata types A and E).
 - 9a. Stems gracile to somewhat robust, herbaceous (sometimes suffruticose at base), 5–80(–200) cm tall; bracteoles (when present) inconspicuous, typically basal or submedial on the pedicel; calyx sometimes auriculate; corolla distinctly bilabiate, various shades of blue or purple, rarely red or white, the tube straight or nearly so; seed coat reticulations roughened (Murata type A) 6. *Lobelia* sect. *Lobelia*
 - 9b. Stems robust, commonly suffruticose or woody, (0.3–)1–4 m tall; bracteoles (when present) typically conspicuous and medial or supra-medial on the pedicel; calyx never auriculate; corolla sub-bilabiate or unilabiate, various shades of red, magenta, pink, yellow, green, or white, the tube curved to arcuate; seed coat reticulations smooth (Murata type E) 10. *Lobelia* sect. *Tylomium*
 - 8b. Seeds striate (Murata type D) or striate-reticulate (Murata type C).
 - 10a. Plants annual (rarely biennial) or perennial, 0.02–0.9(–1.4) m tall; stems gracile, herbaceous (rarely suffruticose); corolla distinctly bilabiate, 3–23(–32) mm long, the lobes strongly dimorphic, the dorsal pair far shorter and narrower than the ventral three (which commonly form a trifid lip); seeds striate (Murata type D); aneuploidy common.
 - 11a. Pedicels (if present) typically basal; corolla tube typically fenestrate, its axis deflected ventrally from the axis of the hypanthium; staminal column included 4. *Lobelia* sect. *Cryptostemon*
 - 11b. Pedicels (if present) typically medial or submedial; corolla tube rarely fenestrate, its axis forming a straight line with the axis of the hypanthium; staminal column exerted.
 - 12a. Pedicels commonly ebracteolate; only the ventral pair of anthers bearded; seeds terete or slightly compressed 5. *Lobelia* sect. *Stenotium*
 - 12b. Pedicels bibracteolate; all five anthers bearded, or rarely nude; seeds trigonous or lenticular.
 - 13a. Plants commonly perennial; ventral corolla lobes all of approximately equal size and shape, forming a trifid lip; plants of Africa, Asia, and South America 1. *Lobelia* sect. *Delostemon*
 - 13b. Plants commonly annual; central ventral corolla lobe by far the largest, forming a prominent lip, the flanking ventral lobes forming a pair of laterals; plants of Australia 2. *Lobelia* sect. *Holopogon*
 - 10b. Plants perennial or pliestesial, (0.2–)1–9 m tall; stems robust or pachycaul, commonly suffruticose or woody; corolla unilabiate or sub-bilabiate (rarely bilabiate), (12–)18–103 mm long, the lobes monomorphic or scarcely dimorphic, all similar in size and shape; testa striate-reticulate (Murata type C); aneuploidy unknown.

- 14a. Leaves petiolate (sessile in one Chinese species); flowers solitary in the axils of the upper leaves (rarely supplemented by a few-flowered terminal raceme); corolla 12–26 mm long.
15a. Corolla white, 12–15 mm long, the tube slightly curved; fruit a capsule; plants of St. Helena 13. *Lobelia* sect. *Trimeris*
.....
15b. Corolla greenish, red-purple, or dark violet (lip often contrastingly striped or spotted), (12–)18–26 mm long, the tube straight; fruit a berry; plants of Asia 14. *Lobelia* sect. *Speirema*
14b. Leaves sessile (petiolate in two rare species); flowers in a many-flowered terminal raceme or panicle; corolla (12–)25–103 mm long.
16a. Pedicels ebracteolate; corolla 45–103 mm long; all five anthers bearded; plants of Hawaii 18. *Lobelia* sect. *Galeatella*
.....
16b. Pedicels commonly bibracteolate; corolla (12–)25–50 mm long; only the ventral anthers bearded (rarely all nude).
17a. Corolla tube curved or arcuate, the lobes spreading; seeds lenticular and commonly winged; plants of Asia, Africa, and South America 16. *Lobelia* sect. *Rhynchoptetalum*
17b. Corolla tube straight or nearly so, the lobes recoiled; seeds terete; plants of Hawaii
..... 17. *Lobelia* sect. *Revolutella*

1. *Lobelia* sect. *Delostemon* (E. Wimm.) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995. *Lobelia* subsect. *Delostemon* E. Wimm., Ann. Naturhist. Mus. Wien 56: 359. 1948. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995]: *Lobelia alsinoides* Lam.

Lobelia grex *Gratioloides* E. Wimm., Ann. Naturhist. Mus. Wien 56: 360. 1948. TYPE [here designated]: *Lobelia alsinoides* Lam.

Lobelia grex *Genistoides* E. Wimm., Ann. Naturhist. Mus. Wien 56: 362. 1948. TYPE [sub Art. 22.6]: *Lobelia genistoides* (C. Presl) A. DC. [= *Lobelia patula* L. f.].

Plants perennial (hemicryptophytes, geophytes, or chamaephytes) or annual, 6–60 cm tall; one species (*Lobelia aquatica* Cham.) hydrophytic. Stems gracile, herbaceous or sometimes suffruticose, prostrate, decumbent, ascending, or erect, simple to branched, sometimes stoloniferous, caespitose, or radican. Leaves sessile or petiolate. Flowers solitary in the axils of the upper leaves or these much reduced, creating a terminal sometimes secund raceme; pedicels bibracteolate at or below the middle. Corolla bilabiate, typically some shade of blue or purple, less often pink or white, 5–20(–32) mm; tube straight, cleft almost to its base on the dorsal side (laterally fenestrate in *Lobelia stenocarpa* E. Wimm.); lobes strongly dimorphic, spreading, almost as long as the tube to longer than the tube, often with a palate or a pair of yellow or white gibbosities on the ventral lip at the mouth of the tube. Staminal column exserted; anthers bearded with tufts of filiform hairs at apex on all 5 (those on the ventral pair sometimes longer). Fruit a capsule. Seeds ovoid to oblong, trigonous or lenticular; testa striate (Murata type D).

Chromosome numbers. $2n = 12, 14, 28$ (Lammers, 1993).

Distribution. Forty-four species in four general regions: (1) Southern Africa: Angola to Mozambique and south, with the greatest concentration of species in the Cape Provinces. Included species: *Lobelia ardisiandroides* Schltr., *L. barkerae* E. Wimm., *L. caerulea* Sims, *L. capillifolia* (C. Presl) A. DC., *L. chamaedryifolia* (C. Presl) A. DC., *L. chamaepitys* Lam., *L. cochlearifolia* Diels, *L. comptonii* E. Wimm., *L. corniculata* Thulin, *L. coronopifolia* L., *L. dasyphylla* E. Wimm., *L. decurrentifolia* (Kuntze) K. Schum., *L. dichroma* Schltr., *L. euryopoda* E. Wimm., *L. linearis* Thunb., *L. malowensis* E. Wimm., *L. neglecta* Schult., *L. patula* L. f., *L. pinifolia* L., *L. preslii* A. DC., *L. pteropoda* (C. Presl) A. DC., *L. setacea* Thunb., *L. thermalis* Thunb., *L. tomentosa* L. f., *L. vanreenensis* (Kuntze) K. Schum. (2) Tropical Africa: Senegal to Ethiopia, Mozambique, and Angola, with *L. goetzei* extending south to Transvaal and *L. stenocarpa* endemic to Madagascar. Included species: *L. baumannii* Engl., *L. blantyrensis* E. Wimm., *L. cobaltica* S. Moore, *L. djurensis* Engl. & Diels, *L. goetzei* Diels, *L. hartlaubii* Buchenau, *L. holstii* Engl., *L. humpatensis* E. Wimm., *L. ovina* E. Wimm., *L. stenocarpa* E. Wimm. (3) Southern and eastern Asia: India and Sri Lanka to Japan, the Ryukyu Islands, Taiwan, the Andaman and Nicobar Islands, the Philippines, and New Guinea. Included species: *L. alsinoides* Lam., *L. chevalieri* Danguy, *L. griffithii* Hook. f. & Thomson, *L. macraeana* E. Wimm., *L. microcarpa* C. B. Clarke, *L. terminalis* C. B. Clarke, *L. zeylanica* L. (4) South America: Colombia to French Guiana and northeastern Argentina; the first species also occurs on Hispaniola. Included species: *L. aquatica* Cham., *L. nummularioides* Cham.

Discussion. The circumscription used here is identical to that of Murata (1995); in Wimmer's (1953, 1968) treatment, it would be equivalent to his *Lobelia* subsect. *Delostemon*, minus *Lobelia* grex

Impares (see below). In recent molecular studies (Knox et al., 2006; Antonelli, 2008), the species of this section plus the next two fell into two clades at the base of the phylogeny. The former also indicated that, if one were to take a strictly cladistic approach to classification, *Grammatotheca* and *Monopsis* might be assigned to this section. If so, the correct name would be a new combination based on *Rapuntium* sect. *Xanthomeria*. If *Monopsis* were retained as a distinct genus, the correct name would be a new combination based on *Rapuntium* sect. *Grammatotheca* (C. Presl) Kuntze.

2. *Lobelia* sect. *Holopogon* Benth., Fl. Austral. 4: 122. 1869. *Rapuntium* sect. *Holopogon* (Benth.) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 357. 1995]: *Lobelia gibbosa* Labill.

Lobelia grex *Impares* E. Wimm., Ann. Naturhist. Mus. Wien 56: 359. 1948. TYPE [here designated]: *Lobelia heterophylla* Labill.

Plants annual or rarely perennial (hemicryptophytes), (2–)10–40(–60) cm tall. Stems gracile, herbaceous, decumbent, ascending, or erect, simple to branched. Leaves sessile or petiolate. Flowers solitary in the axils of the upper leaves or these reduced in size, creating a terminal sometimes secund raceme (rarely a panicle); pedicels bibracteolate near middle. Hypanthium sometimes dorsally distended. Corolla bilabiate, various shades of blue or purple, sometimes marked with yellow, 8–30 mm; tube straight or somewhat curved, cleft almost to its base on the dorsal side, rarely only partway; lobes strongly dimorphic, almost as long as the tube to longer than the tube, spreading, the odd lobe larger than the lateral pair or dorsal pair. Staminal column exserted; anthers bearded with tufts of filiform hairs at apex of all 5 (very rarely all nude). Fruit a capsule. Seeds ovoid or ellipsoid, trigonous or lenticular; testa striate (Murata type D).

Chromosome numbers. $2n = 16, 18, 20, 22$ (Lammers, 1993; Stace & James, 1996).

Distribution. Endemic to Australia; 14 species. Included species: *Lobelia andrewsii* Lammers, *L. dentata* Cav., *L. gibbosa* Labill., *L. gouldii* W. Fitzg., *L. heterophylla* Labill., *L. leichhardii* E. Wimm., *L. psilostoma* E. Wimm., *L. rarifolia* E. Wimm., *L. rhombifolia* de Vriese, *L. rhytidosperma* Benth., *L. simplicicaulis* R. Br., *L. tenuior* R. Br., *L. trigonocaulis* F. Muell., *L. winifrediae* Diels.

Discussion. The circumscription used here is essentially the same as that adopted by Bentham (1876), Schönland (1889), and Post and Kuntze (1903); it is supported by a recent phylogenetic analysis (Knox et al., 2006). Wimmer's (1953, 1968) circumscription of *Lobelia* sect. *Holopogon*, however, was much broader, encompassing diverse extra-Australian species; the section as treated here is equivalent to his *Lobelia* grex *Impares* only. Murata (1995) did not recognize a taxon equivalent to this section, but merely included its species within his *Lobelia* sect. *Pratia*.

Molecular phylogenetic studies (E. Knox, pers. comm.) indicate that the type of *Isotoma* (R. Br.) Lindl., *Lobelia hypocrateriformis* R. Br., logically might be referred to this section (though the remainder of that genus would be referable to *Lobelia* sect. *Hypsela* (C. Presl) Lammers [Heenan et al., 2008; Knox et al., 2008a]). If that species were to be transferred here, the name of the section would not be affected.

3. *Lobelia* sect. *Colensoa* (Hook. f.) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 358. 1995. *Colensoa* Hook. f., Bot. Antarct. Voy. II. (Fl. Nov.-Zel.) 1: 156. 1852. *Pratia* sect. *Colensoa* (Hook. f.) Baill., Hist. Pl. 8: 366. 1885. TYPE [sub Art. 37.3]: *Colensoa physaloides* (A. Cunn.) Hook. f. [$\equiv$ *Lobelia physaloides* A. Cunn.].

Plants perennial (chamaephytes), 0.3–1 m tall. Stems robust, suffrutescent toward base, herbaceous toward apex, sparingly branched, erect to ascending. Leaves long petiolate, prominently serrate. Inflorescence a nodding 5- to 20-flowered pedunculate pseudoaxillary corymbose raceme; pedicels oligobraceolate. Corolla bilabiate, purple or blue, sometimes very pale, 30–45 mm; tube suberect, dorsally cleft to base; lobes monomorphic, almost as long as the tube to longer than the tube, spreading, the dorsal pair nearly distinct, the ventral 3 forming a trifid lip. Staminal column exserted; anthers nude at apex. Fruit a dark blue, globose, fleshy or leathery berry. Seeds ovoid, terete; testa striate (Murata type D).

Chromosome number. $2n = 26$ (Lammers, 1993).

Distribution. Endemic to New Zealand's North Island; monotypic. Included species: *Lobelia physaloides* A. Cunn.

Discussion. Wimmer (1943, 1953, 1968) assigned this section to *Pratia* and included not only *Lobelia physaloides* but also species referable to

Lobelia sect. *Speirema* (Hook. f. & Thomson) Lammers, *Lobelia* sect. *Plagiobotrys* Lammers, and *Lobelia* sect. *Tylomium*. Murata (1995) transferred the section to *Lobelia* subg. *Tupa*, but likewise circumscribed it broadly, encompassing species now assigned to *Lobelia* sect. *Speirema*, *Lobelia* sect. *Plagiobotrys*, and *Lobelia* sect. *Rhynchopetalum*.

The present classification differs from these in restricting the section to its type. This species' subcorymbose pseudoaxillary inflorescence and oligobraceolate pedicels are unique within the genus. Furthermore, in recent molecular phylogenies (Knox et al., 2006; Antonelli, 2008), *Lobelia physaloides* was not related to species of *Lobelia* sect. *Tylomium* or *Lobelia* sect. *Rhynchopetalum* (exemplars of *Lobelia* sect. *Speirema* and *Lobelia* sect. *Plagiobotrys* have yet to be sequenced); instead, it belonged to a clade comprising species of *Lobelia* sect. *Delostemon* and *Lobelia* sect. *Holopogon*. Because *L. physaloides* differs from these two sections in both vegetative and floral morphology, I sequester it in its own monotypic section.

Practical references. Excellent illustrations of this unusual species accompany papers by the Hookers, father (1843) and son (1886).

4. *Lobelia* sect. *Cryptostemon* (E. Wimm.) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995. *Lobelia* subsect. *Cryptostemon* E. Wimm., Ann. Naturhist. Mus. Wien 56: 358. 1948. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995]: *Lobelia fenestralis* Cav.

Plants perennial (hemicryptophytes or geophytes) or rarely annual, (4–)20–90(–140) cm tall. Roots often tuberous. Stems gracile or somewhat robust, herbaceous, erect (rarely decumbent), simple or sometimes sparingly branched, rarely rhizomatous. Leaves sessile or subsessile, often clasping or auriculate, only the rarely present radical leaves petiolate. Flowers in a terminal, often pedunculate spiciform and often secund (rarely subumbellate) raceme; pedicels ebracteolate or bibracteolate at base (rarely middle). Corolla bilabiate, various shades of blue or purple (rarely white), 7–17(–26) mm; tube straight but its axis deflexed ventrally relative to the axis of the hypanthium, typically cleft on the dorsal side almost to its base (rarely only fenestrate at base) and laterally fenestrate (rarely entire); lobes strongly dimorphic, almost as long as the tube to longer than the tube, spreading. Staminal column included; anthers bearded with tufts of filiform hairs at apex

of all 5. Fruit a capsule. Seeds ellipsoid, terete; testa striate (Murata type D).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Endemic to the New World, with nine species from the southwestern United States to Panama, and *Lobelia holotricha* E. Wimm. endemic to Peru. Included species: *L. fenestralis* Cav., *L. hartwegii* A. DC. ex Benth., *L. holotricha* E. Wimm., *L. irasuensis* Planch. & Oerst., *L. jaliscensis* McVaugh, *L. macdonaldii* B. L. Turner, *L. poetica* E. Wimm., *L. sinaloae* Sprague, *L. umbellifera* McVaugh.

Discussion. The treatment here is identical to that of Murata (1995); Wimmer's (1953, 1968) circumscription of the taxon was the same, but it was ranked and positioned as a subsection of *Lobelia* sect. *Holopogon*. Though the species of *Lobelia* sect. *Cryptostemon* do possess five bearded anthers like *Lobelia* sect. *Holopogon*, they do not produce the distinctive trigonous or lenticular seeds of that section. Furthermore, a close relationship between an Australian and a fundamentally North American group seems unlikely.

The molecular phylogeny of Koopman and Ayers (2005) suggested that the section may be biphyletic: *Lobelia irasuensis* belonged to a clade composed largely of North American species of *Lobelia* sect. *Stenotium* (C. Presl) Lammers, while *L. fenestralis* was sister to the type of *Lobelia* sect. *Homochilus*. In Antonelli's (2008) analysis, the sole exemplar of *Lobelia* sect. *Cryptostemon* was part of a clade that included all sampled species of *Lobelia* sect. *Homochilus* and *Lobelia* sect. *Tylomium*, plus North American representatives of *Lobelia* sect. *Stenotium*. Further sampling is needed to resolve these phylogenetic relationships, but on the basis of overall morphology, including that of the seeds, a relationship to *Lobelia* sect. *Stenotium* seems the more likely.

5. *Lobelia* sect. *Stenotium* (C. Presl) Lammers, Fl. China 19: 556. 2011. *Rapuntium* sect. *Stenotium* C. Presl, Prodr. Monogr. Lobel. 11. 1836. *Lobelia* [unranked] *Stenotium* (C. Presl) Benth., Enum. Pl. [Endlicher] 74. 1837. TYPE [here designated]: *Rapuntium erinus* (L.) Mill. [= *Lobelia erinus* L.].

Enchysia C. Presl, Prodr. Monogr. Lobel. 40. 1836. *Laurentia* [unranked] *Enchysia* (C. Presl) Endl., Gen. Pl. 512. 1838. *Lobelia* [unranked] *Enchysia* (C. Presl) Heynh., Nomencl. Bot. Hort. 1: 470. 1840. *Laurentia* subg. *Enchysia* (C. Presl) Peterm., Pflanz.

- zenreich 444. 1845. TYPE [designated by Pfeiffer, Nomencl. Bot. 1: 1199. 1874]: *Lobelia erinoides* L. [= *Lobelia erinus* L.].
- Lobelia* [unranked] *Xalapenses* Small, Man. S.E. Fl. 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia xalapensis* Kunth.
- Lobelia* grex *Subspicatae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 341. 1948. TYPE [here designated]: *Lobelia gruina* Cav.
- Lobelia* grex *Rosulatae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 342. 1948. TYPE [here designated]: *Lobelia lepida* E. Wimm.
- Lobelia* grex *Pterocaulinae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 343. 1948. TYPE [here designated]: *Lobelia anceps* L. f.
- Lobelia* grex *Eriniformes* E. Wimm., Ann. Naturhist. Mus. Wien 56: 346. 1948. TYPE [sub Art. 22.6]: *Lobelia erinus* L.
- Lobelia* [unranked] *Pusillae* E. Wimm., Pflanzenr. IV, 276b: 496. 1953. TYPE [here designated]: *Lobelia erlangiana* Engl.
- Lobelia* [unranked] *Subgrandiflores* E. Wimm., Pflanzenr. IV, 276b: 500. 1953. TYPE [here designated]: *Lobelia sublibera* S. Watson.
- Lobelia* [unranked] *Latifoliae* E. Wimm., Pflanzenr. IV, 276b: 502. 1953. TYPE [here designated]: *Lobelia berlandieri* A. DC.
- Lobelia* [unranked] *Angustifoliae* E. Wimm., Pflanzenr. IV, 276b: 533. 1953. TYPE [here designated]: *Lobelia linarioides* (C. Presl) A. DC.
- Lobelia* [unranked] *Dissectifoliae* E. Wimm., Pflanzenr. IV, 276b: 552. 1953. TYPE [sub Art. 22.6]: *Lobelia dissecta* M. B. Moss.
- Heterotoma* sect. *Microcentron* E. Wimm., Pflanzenr. IV, 276b: 716. 1953. TYPE [here designated]: *Heterotoma cordifolia* (Hook. & Arn.) McVaugh [= *Lobelia cordifolia* Hook. & Arn.].
- Lobelia* sect. *Heyneana* J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 355. 1995. TYPE [designated by the author]: *Lobelia heyneana* Schult.
- Calcaratolobelia* Wilbur, Sida 17: 561. 1997. TYPE [designated by the author]: *Calcaratolobelia cordifolia* (Hook. & Arn.) Wilbur [= *Lobelia cordifolia* Hook. & Arn.].

Plants annual or perennial (commonly hemicryptophytes, less often geophytes or chamaephytes), 2–50(–90) cm tall. Stems gracile, herbaceous or suffruticose, prostrate, decumbent, ascending, or erect, sometimes rhizomatous or stoloniferous, terete to sharply 3- to 4-angled or -winged; latex white (rarely orange). Leaves sessile or petiolate. Flowers solitary in the axils of the upper leaves or these reduced in size, creating a terminal, sometimes secund raceme (rarely spiciform or corymbose); pedicels ebracteolate or bibracteolate at or below (rarely above) the middle. Corolla bilabiate, 3–20(–24) mm, various shades of blue, purple, pink, or white; tube straight or somewhat curved, typically cleft almost to its base (rarely only to the middle) on the dorsal side, rarely fenestrate, sometimes the ventral side prolonged into a distinct short or long slender nectar spur that distends the hypanthium;

lobes strongly dimorphic, almost as long as the tube to longer than the tube, spreading, sometimes with a pair of gibbosities on the ventral lip at the mouth of the tube. Staminal column exerted; anthers bearded with tufts of filiform hairs (rarely also with a single apical bristle each) at apex of the ventral pair. Ovary sometimes almost superior through reduction of the hypanthium. Fruit a capsule or rarely baccate. Seeds ovoid to oblong, terete or somewhat compressed; testa striate (Murata type D).

Chromosome numbers. $2n = 12, 14, 24, 26, 28, 38, 42$ (Lammers, 1993; Stace & James, 1996).

Distribution. One hundred forty-four species in eight major regions: (1) Continental North America: southern United States to Panama, with *Lobelia nana* Kunth and *L. xalapensis* extending south to Argentina and *L. fastigiata* Kunth to eastern Brazil (chromosome numbers: $2n = 14, 28$). Included species: *L. anatina* E. Wimm., *L. aurita* (Brandegge) T. J. Ayers, *L. berlandieri* A. DC., *L. caeciliae* E. Wimm., *L. circaeoides* (C. Presl) A. DC., *L. cordifolia* Hook. & Arn., *L. diastateoides* McVaugh, *L. diazluae* Rzed. & Calderón, *L. dielsiana* E. Wimm., *L. divaricata* Hook. & Arn., *L. ehrenbergii* Vatke, *L. endlichii* (E. Wimm.) T. J. Ayers, *L. fastigiata* Kunth, *L. flexicaulis* Rzed. & Calderón, *L. flexuosa* (C. Presl) A. DC., *L. gladiaria* McVaugh, *L. glaucescens* E. Wimm., *L. goldmanii* (Fernald) T. J. Ayers, *L. gruina* Cav., *L. gypsophila* T. J. Ayers, *L. henricksonii* M. C. Johnst., *L. hintoniorum* B. L. Turner, *L. homophylla* E. Wimm., *L. hypnodes* E. Wimm. ex McVaugh, *L. illota* McVaugh, *L. knoblochii* T. J. Ayers, *L. lithophila* Senterre & Cast.-Campos, *L. longicaulis* Brandegge, *L. macrocentron* (Benth.) T. J. Ayers, *L. margarita* E. Wimm., *L. mcvaughii* T. J. Ayers, *L. mexicana* E. Wimm., *L. nana* Kunth, *L. obconica* E. Wimm., *L. occidentalis* McVaugh & Huft, *L. orientalis* Rzed. & Calderón, *L. porphyrea* Rzed. & Calderón, *L. pringlei* S. Watson, *L. pulchella* Vatke, *L. purpusii* Brandegge, *L. sartorii* Vatke, *L. scrobiculata* E. Wimm., *L. standleyi* McVaugh, *L. stenodonta* (Fernald) McVaugh, *L. stolonifera* Donn. Sm., *L. sublibera* S. Watson, *L. subnuda* Benth., *L. tarsophora* Seaton ex Greenm., *L. villaregalis* T. J. Ayers, *L. volcanica* T. J. Ayers, *L. xalapensis* Kunth, *L. yucatana* E. Wimm. (2) Caribbean (chromosome numbers: $2n = 14, 28$). Included species: *Lobelia cliffortiana* L. (Antilles), *L. lucayana* Britton & Millsp. (Bahamas, Turks and Caicos Islands). (3) South America: Venezuela to Peru and northern Argentina. Included species: *L. camporum* Pohl, *L. collina* Kunth, *L. luruniensis* E. Wimm., *L. modesta* Wedd., *L. paranaensis* R. Braga,

L. subpubera Wedd., *L. tenera* Kunth. (4) Northwestern Africa (Morocco), western Europe (Iberian Peninsula to France and southern Britain), and Macaronesia (Azores, Madeira) (chromosome number: $2n = 14$). Included species: *L. urens* L. (5) Tropical Africa: Senegal to Somalia and Mozambique, with *L. erinus* L. and *L. trullifolia* Hemsl. extending to southern Africa (chromosome numbers: $2n = 12, 14, 26, 28, 38, 42$). Included species: *L. acutidens* Hook. f., *L. adnexa* E. Wimm., *L. cheranganiensis* Thulin, *L. chirensis* A. Rich., *L. cymbalarioides* Engl., *L. dissecta* M. B. Moss, *L. duriprati* T. C. E. Fr., *L. erinus* L., *L. erlangeriana* Engl., *L. exilis* Hochst. ex A. Rich., *L. fervens* Thunb., *L. flaccida* (C. Presl) A. DC., *L. gilgii* Engl., *L. gillettii* De Wild., *L. gracillima* Welw. ex Hiern, *L. graniticola* E. Wimm., *L. henodon* E. Wimm., *L. inconspicua* A. Rich., *L. intercedens* (E. Wimm.) Thulin, *L. kalobaensis* E. Wimm. ex Thulin, *L. kirkii* R. E. Fr., *L. kundelungensis* Thulin, *L. lasiocalycina* E. Wimm., *L. lepida* E. Wimm., *L. lindblomii* Mildbr., *L. lisowskii* Thulin, *L. livingstoniana* R. E. Fr., *L. lobata* E. Wimm., *L. minutula* Engl., *L. molleri* Henriq., *L. neumannii* T. C. E. Fr., *L. paludigena* Thulin, *L. quarreana* E. Wimm., *L. rivalis* E. Wimm., *L. rubescens* De Wild., *L. sapinii* De Wild., *L. scebelii* Chiov., *L. schimperii* Hochst. ex A. Rich., *L. tripartita* Thulin, *L. trullifolia* Hemsl., *L. uliginosa* E. Wimm., *L. welwitschii* Engl. & Diels. (6) Southern Africa: Namibia and the Cape Provinces to Natal and Swaziland, with *L. anceps* L. f. extending east to Mozambique, Madagascar, Australia, Norfolk Island, New Zealand, Kermadec Island, Chatham Island, Rapa, Pitcairn Island, Juan Fernández Island, and Chile (chromosome numbers: $2n = 14, 42$). Included species: *Lobelia anceps* L. f., *L. aquamontis* E. Wimm., *L. boivinii* Sond., *L. comosa* L., *L. cuneifolia* Link & Otto, *L. cyphioides* Harv., *L. dregeana* (C. Presl) A. DC., *L. filipes* E. Wimm., *L. galpinii* Schltr., *L. hereroensis* Schinz, *L. hypsibata* E. Wimm., *L. laurentioides* Schltr., *L. laxa* MacOwan, *L. linarioides* (C. Presl) A. DC., *L. muscoides* Cham., *L. oreas* E. Wimm., *L. parvisepala* E. Wimm., *L. pentheri* E. Wimm., *L. pubescens* Aiton, *L. reinekeana* E. Wimm., *L. stenosphon* (Adamson) E. Wimm., *L. sutherlandii* E. Wimm., *L. valida* L. Bolus, *L. wilmsiana* Diels. (7) Madagascar and the Mascarenes. Included species: *L. agrestis* E. Wimm., *L. cyanea* E. Wimm., *L. filiformis* Lam., *L. hirtipes* E. Wimm., *L. horombensis* E. Wimm., *L. lingulata* E. Wimm., *L. parva* Badré & Cadet, *L. perrieri* E. Wimm., *L. serpens* Lam., *L. solaris* E. Wimm., *L. spathopetala* Diels, *L. telephioides* (C. Presl) A. DC., *L. vagans* Balf. f. (8) Southern and eastern Asia: Oman to China, Taiwan, the Philippines, and New Guinea, with *L. heyneana*

Schult. extending into tropical Africa (Ethiopia to Zaire and Zambia) (chromosome number: $2n = 24$). Included species: *Lobelia hainanensis* E. Wimm., *L. heyneana* Schult., *L. luzoniensis* (Pers.) Merr.

Discussion. This section is nearly identical to Murata's (1995) *Lobelia* sect. *Heyneana*; the name change is dictated by the rules of priority. It is likewise similar to Wimmer's (1953, 1968) *Lobelia* subsect. *Leiospermae*, with two exceptions: (1) the exclusion of *Lobelia* grex *Dioicae* (here assigned to *Lobelia* sect. *Hypsela*), and (2) the inclusion of all species of *Heterotoma* Zucc. save its type (cf. Ayers, 1990; Wilbur, 1997).

In Koopman and Ayers' (2005) molecular phylogeny, the sampled species (all North American) fell into a single clade. The preliminary results of Knox et al. (2006) and Antonelli (2008), however, suggest that the section may be polyphyletic along geographic lines. Far more sampling will be required to resolve the issue. Assignment of the genus *Wimmerella* Serra, M. B. Crespo & Lammers to this section (cf. Knox et al., 2006) would not affect its name.

6. *Lobelia* L. sect. *Lobelia*.

Rapuntium Mill., Gard. Dict. Abr., ed. 4. 1754. *Lobelia* sect. *Rapuntium* (Mill.) A. DC., Prodr. (DC.) 7: 357. 1839. TYPE [designated by Lammers, World Checkl. Bibliogr. Campanulaceae: 509. 2007]: *Rapuntium cardinale* (L.) Mill. [= *Lobelia cardinalis* L.]. [Although *Lobelia* sect. *Rapuntium* must be replaced by this autonym (Art. 22.1), the former nevertheless was validly published because it did not include all elements eligible as the type of *Lobelia* at that time (Art. 22.2).]

Dortmanna O. O. Rudbeck ex Hill, Brit. Herb. 126. 1756. *Lobelia* [unranked] *Dortmanna* (O. O. Rudbeck ex Hill) Endl., Gen. Pl. 512. 1838. *Rapuntium* sect. *Dortmanna* (O. O. Rudbeck ex Hill) Kuntze, Lex. Gen. Phan. 477. 1903, as "*Dortmannia*." TYPE [sub Art. 37.3]: *Lobelia dortmanna* L.

Rapuntium sect. *Sphaerangium* C. Presl, Prodr. Monogr. Lobel. 19. 1836. *Lobelia* [unranked] *Sphaerangium* (C. Presl) Endl., Gen. Pl. 511. 1838. TYPE [here designated]: *Rapuntium siphiliticum* (L.) Mill. [= *Lobelia siphilitica* L.].

Lobelia sect. *Eulobelia* Benth., Gen. Pl. [Bentham & Hooker f.] 2: 552. 1876, nom. invalid. sub Art. 21.3.

Rapuntium sect. *Cardinalis* Kuntze, Lex. Gen. Phan. 477. 1903. TYPE [sub Art. 22.6]: *Lobelia cardinalis* L. [This name was validly published because the type of the genus had not yet been designated and the taxon represented did not include all species eligible as type of the genus (Art. 22.2).]

Petromarula Belli ex Nieuwl. & Lunell, Amer. Midl. Naturalist 5: 13. 1917, nom. illeg. sub Art. 53.1, non *Petromarula* Vent. ex R. Hedw., Gen. Pl. 139. 1806. TYPE [designated by Lammers, World Checkl. Bibliogr. Campanulaceae: 509. 2007]: *Petromarula hirtella* (A. Gray) Nieuwl. & Lunell [= *Lobelia spicata* Lam.].

- Lobelia* [unranked] *Appendiculatae* Small, Man. S.E. Fl. [Small] 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia appendiculata* A. DC.
- Lobelia* [unranked] *Spicatae* Small, Man. S.E. Fl. [Small] 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia spicata* Lam.
- Lobelia* [unranked] *Nuttallianae* Small, Man. S.E. Fl. [Small] 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia nuttallii* Schult.
- Lobelia* [unranked] *Paludosae* Small, Man. S.E. Fl. [Small] 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia paludosa* Nutt.
- Lobelia* [unranked] *Siphiliticae* Small, Man. S.E. Fl. [Small] 1291. 1933. TYPE [sub Art. 22.6]: *Lobelia siphilitica* L.
- Lobelia* subg. *Lagotis* E. Wimm., Ann. Naturhist. Mus. Wien 56: 338. 1948, nom. invalid. sub Art. 22.2.
- Lobelia* subsect. *Trachyspermae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 338. 1948, nom. invalid. sub Art. 22.2.
- Lobelia* grex *Cardinales* E. Wimm., Ann. Naturhist. Mus. Wien 56: 338. 1948, nom. invalid. sub Art. 22.2.
- Lobelia* grex *Coelestes* E. Wimm., Ann. Naturhist. Mus. Wien 56: 340. 1948. TYPE [here designated]: *Lobelia siphilitica* L.
- Lobelia* subgrex *Kalmia* E. Wimm., Ann. Naturhist. Mus. Wien 56: 340. 1948. TYPE [sub Art. 37.3]: *Lobelia siphilitica* L. [Although one might think that *Lobelia kalmii* would be the type of this name under Article 22.6, it was not mentioned in the protologue.]
- Lobelia* subgrex *Dortmannia* E. Wimm., Ann. Naturhist. Mus. Wien 56: 340. 1948. TYPE [sub Art. 37.3]: *Lobelia dortmanna* L.

Plants perennial (hemicryptophytes), less often annual or biennial, 5–80(–200) cm tall, rarely hydrophytic, a few species sometimes gynodioecious. Stems gracile (rarely somewhat robust), herbaceous (sometimes suffruticose at base), decumbent, ascending, or erect, simple to much branched, sometimes basally rosulate. Leaves sessile or petiolate. Flowers in a terminal raceme (sometimes secund); pedicels bibracteolate at base (rarely near middle, or ebracteolate). Calyx sometimes with a reflexed auriculate appendage in each sinus. Corolla bilabiate, various shades of blue or purple, often with a white eye, or rarely red or white (red in *Lobelia cardinalis*), 5–20(–46) mm; tube straight, cleft almost to its base on the dorsal side, sometimes laterally fenestrate; lobes strongly dimorphic, almost as long as the tube to longer than the tube, spreading, sometimes with a pair of green or white gibbosities on the ventral lip at the mouth of the tube. Anthers bearded with tufts of filiform hairs at the apex of the ventral pair. Fruit a capsule. Seeds ovoid, ellipsoid, or oblong, terete or irregularly angular; testa roughened reticulate (Murata type A).

Chromosome numbers. $2n = 14, 28, 42$ (Lammers, 1993).

Distribution. Nearly endemic to eastern and central North America, with *Lobelia cardinalis* extending west to California and south through Mexico and Central America to Colombia, and *L. dortmanna* extending eastward into northern Europe; 22 species. Included species: *Lobelia amoena* Michx., *L. appendiculata* A. DC., *L. boykinii* Torr. & A. Gray ex A. DC., *L. brevifolia* Nutt. ex A. DC., *L. canbyi* A. Gray, *L. cardinalis* L., *L. dortmanna* L., *L. elongata* Small, *L. feayana* A. Gray, *L. flaccidifolia* Small, *L. floridana* Chapm., *L. gattingeri* A. Gray, *L. georgiana* McVaugh, *L. glandulosa* Walter, *L. inflata* L., *L. kalmii* L., *L. nuttallii* Schult., *L. paludosa* Nutt., *L. puberula* Michx., *L. reverchonii* B. L. Turner, *L. siphilitica* L., *L. spicata* Lam.

Discussion. The circumscription used here is identical to that of Murata (1995). Wimmer's (1953, 1968) circumscription, however, was much broader, encompassing diverse Old World species as well; the section as treated here is equivalent to his *Lobelia* subsect. *Trachyspermae*. The molecular phylogeny of Antonelli (2008) supports the present circumscription, but suggests that Antillean *L. rotundifolia* Juss. ex A. DC. may belong here rather than in *Lobelia* sect. *Tylomium* (cf. McVaugh, 1943).

Practical references. A key and detailed descriptions for these species were provided by McVaugh (1943).

7. *Lobelia* sect. *Hypsela* (C. Presl) Lammers, Fl. China 19: 555. 2011. *Hypsela* C. Presl, Prodr. Monogr. Lobel. 45. 1836. *Lysipomia* sect. *Hypsela* (C. Presl) A. DC., Prodr. (DC.) 7: 350. 1839. *Pratia* sect. *Hypsela* (C. Presl) Baill., Hist. Pl. 8: 366. 1885. TYPE [sub Art. 37.3]: *Hypsela reniformis* (Kunth) C. Presl [= *Lobelia oligophylla* (Wedd.) Lammers].

Pratia Gaudich., Ann. Sci. Nat. (Paris) 5: 103. 1825. *Pratia* [unranked] *Eupratia* Endl., Gen. Pl. 512. 1838, nom. invalid. sub Art. 21.3. *Lobelia* [unranked] *Pratia* (Gaudich.) Heynh., Nomencl. Bot. Hort. 1: 473. 1840. *Lobelia* sect. *Pratia* (Gaudich.) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995, nom. invalid. sub Art. 33.4. TYPE [sub Art. 37.3]: *Pratia repens* Gaudich. [= *Lobelia pratiana* Gaudich. ex Lammers].

Holostigma G. Don, Gen. Hist. 3: 716. 1834. *Monopsis* [unranked] *Holostigma* (G. Don) Endl., Gen. Pl. 511. 1838. *Holostigmateia* Rchb., Deut. Bot. Herb.-Buch 57. 1841, nom. illeg. sub Art. 52.1. TYPE [sub Art. 37.3]: *Holostigma dioicum* (R. Br.) G. Don [= *Lobelia dioica* R. Br.].

Pratia [unranked] *Bernonia* Endl., Gen. Pl. 512. 1838. *Bernonia* (Endl.) Meisn., Pl. Vasc. Gen. [Meisner] 148. Aug 1839. *Piddingtonia* A. DC., Prodr. (DC.) 7:

341. Dec. 1839, nom. illeg. sub Art. 52.1. *Lobelia* [unranked] *Piddingtonia* Heynh., Nomencl. Bot. Hort. 1: 473. 1840, nom. illeg. sub Art. 52.1. TYPE [sub Art. 37.3]: *Lobelia begoniifolia* Wall. [= *Lobelia nummularia* Lam.].
- Isolobus* A. DC., Prodr. (DC.) 7: 352. 1839. *Lobelia* [unranked] *Isolobus* (A. DC.) Heynh., Nomencl. Bot. Hort. 1: 471. 1840. *Monopsis* [unranked] *Isolobus* (A. DC.) Endl., Gen. Pl. 1391. 1841. *Lobelia* sect. *Isolobus* (A. DC.) C. B. Clarke, Fl. Brit. India [J. D. Hooker] 3: 425. 1881. *Rapuntium* sect. *Isolobus* (A. DC.) Kuntze, Lex. Gen. Phan. 478. 1903. *Lobelia* subg. *Isolobus* (A. DC.) Y. S. Lian, Fl. Reipubl. Popularis Sin. 73(2): 154. 1983. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 357. 1995]: *Isolobus radicans* (Thunb.) A. DC. [= *Lobelia chinensis* Lour.].
- Lobelia* sect. *Hemipogon* Benth., Fl. Austral. 3: 123. 1867. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 357. 1995]: *Lobelia stenophylla* Benth.
- Lobelia* subsect. *Leiospermae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 340. 1948. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995]: *Lobelia dioica* R. Br.
- Lobelia* grex *Dioicae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 340. 1948. *Lobelia* sect. *Dioicae* (E. Wimm.) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 356. 1995, as “*Dioica*.” TYPE [sub Art. 22.6]: *Lobelia dioica* R. Br.
- Lobelia* [unranked] *Prostratae* E. Wimm., Pflanzenr. IV, 276b: 480. 1953. TYPE [here designated]: *Lobelia linnaeoides* (Hook. f.) Petrie [= *Lobelia angulata* G. Forst.].
- Lobelia* sect. *Paramezleria* E. Wimm., Pflanzenr. IV, 276b: 607. 1953. TYPE [sub Art. 37.3]: *Lobelia roughii* Hook. f.

Plants perennial (hemicryptophytes or geophytes) or less often annual, 2–40 cm tall; a few species dioecious. Stems gracile, herbaceous, commonly prostrate, radican, or caespitose, rarely decumbent or ascending. Leaves commonly small, petiolate or rarely sessile; lamina typically not much longer than wide, variously rounded at apex and base; margin coarsely toothed or shallowly lobed. Flowers solitary in the axils of the upper leaves or very rarely these reduced in size, creating a terminal raceme (rarely corymbose); pedicels ebracteolate or less often bibracteolate. Corolla sub-bilabiate (unilabiate in *Lobelia chinensis*), 2–12(–15) mm, blue, purple, magenta, pink, or white; tube dorsally cleft to base (less often to middle or rarely entire), straight or nearly so; lobes monomorphic (rarely becoming somewhat dimorphic), almost as long as the tube to longer than the tube, spreading. Staminal column exerted, sometimes adnate to the corolla tube; anthers with a single long bristle on the apex of each ventral anther, often also bearded with tufts of shorter filiform hairs, very rarely all nude. Fruit a capsule or fleshy berry. Seeds ovoid to oblong, terete (rarely slightly compressed); testa reticulate (Murata type B).

Chromosome numbers. $2n = 12, 14, 28, 42, 56, 70, 77, 84, 91, 140$ (Lammers, 1993; Stace & James, 1996; Murray et al., 2004).

Distribution. Amphi-Pacific, largely in the Southern Hemisphere, with 43 species in four disjunct regions: (1) Southern and eastern Asia: India to Japan, the Ryukyu Islands, Taiwan, the Philippines, and New Guinea. Included species: *Lobelia archboldiana* (Merr. & L. M. Perry) Moeliono, *L. brachyantha* Merr. & L. M. Perry, *L. chinensis* Lour., *L. conferta* Merr. & L. M. Perry, *L. donanensis* P. Royen, *L. loochooensis* Koidz., *L. nummularia* Lam., *L. victoriensis* P. Royen. (2) Australia. Included species: *L. arnhemiaca* E. Wimm., *L. australiensis* Lammers, *L. beaugleholei* Albr., *L. benthamii* F. Muell., *L. concolor* R. Br., *L. darlingensis* (E. Wimm.) Albr., *L. dioica* R. Br., *L. gelida* F. Muell., *L. humistrata* F. Muell. ex F. M. Bailey, *L. irrigua* R. Br., *L. leucotos* Albr., *L. membranacea* R. Br., *L. mezlerioides* E. Wimm., *L. pedunculata* R. Br., *L. platycalyx* (F. Muell.) F. Muell., *L. pratioides* Benth., *L. purpurascens* R. Br., *L. quadrangularis* R. Br., *L. stenophylla* Benth., *L. surrepens* Hook. f. (3) New Zealand. Included species: *L. angulata* G. Forst., *L. arenaria* (Hook. f.) Heenan & de Lange, *L. carens* Heenan, *L. fatiscens* Heenan, *L. fugax* Heenan, Courtney & P. N. Johnson, *L. glaberrima* Heenan, *L. ionantha* Heenan, *L. linnaeoides* (Hook. f.) Petrie, *L. macrodon* (Hook. f.) Lammers, *L. perpusilla* Hook. f., *L. roughii* Hook. f. (4) Southern South America: Bolivia and southeastern Brazil to Tierra del Fuego and the Falkland Islands. Included species: *L. hederacea* Cham., *L. oligophylla* (Wedd.) Lammers, *L. pratiana* Gaudich. ex Lammers, *L. reniformis* Cham.

Discussion. This section plus the next two would be essentially equivalent to Murata’s (1995) *Lobelia* subg. *Mezleria*, differing in (1) removal of *L. gibbosa* and its allies as *Lobelia* sect. *Holopogon*; (2) removal of *L. gillettii* to *Lobelia* sect. *Stenotium*; and (3) inclusion of *Hypsela*, which brings with it the name with priority (Chiapella, 1996; Lammers, 1999a). In Wimmer’s (1943, 1953, 1968) system, however, the species included here were scattered among *Hypsela*, *Lobelia* sect. *Isolobus*, *Lobelia* sect. *Paramezleria*, two different grexes within *Lobelia* subsect. *Leiospermae*, and *Pratia* sect. *Pratia*.

Recent molecular studies (Knox et al., 2006, 2008a; Antonelli, 2008; Heenan et al., 2008) support the circumscription used here. These studies also make it clear that most of the species of *Isotoma* (but not its type, which is allied to *Lobelia* sect.

Holopogon; see above) should likewise be included here. However, 13 of the 15 taxa affected have no available name in *Lobelia* (*L. fluviatilis* R. Br. and *L. scapigera* R. Br. are the exceptions), so they are left in *Isotoma* for the present. Conversely, the four species recently described from New Zealand, which form a clade sister to *L. fluviatilis* (R. Br.) F. Muell. ex Benth., have no names in that genus and so are listed here.

8. *Lobelia* sect. *Mezleriopsis* Lammers, sect. nov.

TYPE: *Lobelia sonderiana* (Kuntze) Lammers.

Sectio a ceteris sectionibus *Lobeliae* corolla sub-bilabiata parva lobis plus minusve aequabilibus, antheris ventralibus apice setiferis et seminibus ellipsoideis vel oblongis testa subtiliter striata (typo D Muratae) distinguenda.

Plants annual or less often perennial (hemicryptophytes), 2–20 cm tall. Stems gracile, herbaceous, decumbent, caespitose or radican. Leaves sessile or petiolate. Flowers solitary in the axils of the upper leaves or these reduced in size, creating a lax terminal raceme; pedicels ebracteolate or bibracteolate below the middle. Hypanthium sometimes distended ventrally; calyx lobes sometimes only 4. Corolla 1–5(–7) mm, sub-bilabiate, blue, purple, pink, or white; tube straight, cleft almost to its base on the dorsal side; lobes monomorphic, almost as long as the tube to longer than the tube, spreading, the dorsal pair nearly distinct from the trifold lip, sometimes with a crescent-shaped palate on the ventral lip at the mouth of the tube. Staminal column exserted; anthers with a single bristle (sometimes also with tufts of filiform hairs) at apex of each of the ventral pair. Fruit a capsule. Seeds ellipsoid to oblong, terete; testa striate (Murata type D).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Nearly endemic to the Cape Provinces of South Africa, with *Lobelia sonderiana* extending north to Kenya; seven species. Included species: *Lobelia dodiana* E. Wimm., *L. filicaulis* (C. Presl) Schönland, *L. limosa* (Adamson) E. Wimm., *L. nugax* E. Wimm., *L. quadrisepala* (R. D. Good) E. Wimm., *L. sonderiana* (Kuntze) Lammers, *L. zwartkopensis* E. Wimm.

Discussion. This section is essentially identical in circumscription to Wimmer's (1953, 1968) *Lobelia* sect. *Mezleria*. Because the names *Mezleria* and *Lobelia* sect. *Eumezleria* are typified by a species of *Monopsis* (Lammers, 1999b, 2007a), however, they cannot be applied to this taxon. In coining the new

name, an epithet reminiscent of them has been selected.

There is no equivalent taxon in Murata's (1995) classification; these species were simply included in his *Lobelia* sect. *Pratia*. It might have been possible here to parallel his approach by including these species in *Lobelia* sect. *Hypsela*, but it was felt that the differences in habit, seed coat, and biogeography made the recognition of a separate section useful. This decision is strongly supported by Antonelli's (2008) cladogram, in which the type species is sister to clades 3 to 8, while the exemplars of *Lobelia* sect. *Hypsela* constitute clade 7.

Practical references. An excellent illustration of the type species is provided by Thulin (1984: fig. 4), under the name *Lobelia angolensis* Engl. & Diels.

9. *Lobelia* sect. *Jasionopsis* Lammers, sect. nov.

TYPE: *Lobelia jasionoides* (A. DC.) E. Wimm.

Sectio a ceteris sectionibus *Lobeliae* inflorescentia ex racemo corymboso vel subumbellato constante, corolla unilabiata parva lobis plus minusve aequabilibus transverse signatis, antheris ventralibus apice setiferis et seminibus ovoideis testa reticulata (typo B Muratae) distinguenda.

Plants annual or perennial (hemicryptophytes), 10–30 cm tall. Stems gracile, herbaceous, decumbent or ascending. Leaves sessile toward apex, petiolate below. Flowers in a terminal corymbose or subumbellate raceme; pedicels bibracteolate at base. Corolla 4–5 mm, unilabiate, pink or white with several transverse red or purple marks on each lobe; tube straight, cleft almost to its base; lobes monomorphic, almost as long as the tube to longer than the tube, deflexed. Staminal column exserted; anthers with a single apical bristle and a tuft of shorter filiform hairs on each of the ventral pair. Fruit a capsule. Seeds ovoid, terete; testa reticulate (Murata type B).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Endemic to the Cape Provinces of South Africa; monotypic. Included species: *Lobelia jasionoides* (A. DC.) E. Wimm.

Discussion. In Wimmer's (1953, 1968) classification, this species and Asian *Lobelia chinensis* were the sole members of *Lobelia* sect. *Isolobus*. In light of the demonstrated geographic coherence of most lobelioid lineages (Knox et al., 2006, 2008a, 2008b; Antonelli, 2008), one might suspect that such a taxon was biphyletic. The suite of low habit,

monomorphic corolla lobes, awned ventral anthers, and reticulate testa that characterize both species is matched by the members of *Lobelia* sect. *Hypsela* and (except for the testa) *Lobelia* sect. *Mezleriopsis*. The primary character that distinguished *L. jasionoides* and *L. chinensis* from those taxa, which was used by Wimmer to unite them as *Lobelia* sect. *Isolobus*, was their unilabiate corolla. In light of biogeography and the other morphological features, I hypothesize that this was a parallelism and not a synapomorphy: the unilabiate species *L. chinensis* and *L. jasionoides* arose independently from the sub-bilabiate species of *Lobelia* sect. *Hypsela* and *Lobelia* sect. *Mezleriopsis*, respectively.

Lobelia chinensis is similar enough to sympatric *Lobelia* sect. *Hypsela* to include it therein (a move supported by molecular phylogeny [Antonelli, 2008]). However, *L. jasionoides* differs from sympatric *Lobelia* sect. *Mezleriopsis* in enough features (inflorescence type, corolla structure and pigmentation, seed morphology) that it is desirable to segregate it as a monotypic section. Because of Murata's (1995) choice of *L. chinensis* as the lectotype of *Lobelia* sect. *Isolobus*, it is not possible to use that name for a section that only includes *L. jasionoides*.

Practical references. An excellent color illustration of the sole species is provided by Sims (1826), under the name *Lobelia corymbosa* Hook. ex Graham.

10. *Lobelia* sect. *Tylomium* (C. Presl) Benth., Gen. Pl. [Bentham & Hooker f.] 2: 552. 1876. *Tylomium* C. Presl, Prodr. Monogr. Lobel. 31. 1836. *Tupa* sect. *Tylomium* (C. Presl) A. DC., Prodr. (DC.) 7: 394. 1839. *Rapuntium* sect. *Tylomium* (C. Presl) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [designated by Pfeiffer, Nomencl. Bot. 2: 1515. 1874]: *Lobelia assurgens* L.

Plants perennial (hemicryptophytes or chamaephytes) or shrubs, (0.3–)1–4 m tall. Stems robust, herbaceous, suffruticose, or woody, ascending or erect, simple to branched, sometimes apically rosulate. Leaves sessile or more commonly petiolate. Flowers in a terminal raceme; pedicels bibracteolate, often conspicuously so, usually near or above the middle, or rarely ebracteolate. Corolla sub-bilabiate (rarely unilabiate), magenta, pink, red, orange, yellow, green, or white, concolorous, 10–40(–57) mm; tube curved or arcuate, sometimes laterally fenestrate; lobes as long as the tube or longer, spreading. Anthers bearded with tufts of filiform hairs at apex of the ventral pair or rarely all 5. Fruit a capsule or berry. Seeds globose, ovoid, or ellipsoid,

terete or rarely compressed; testa reticulate (Murata type E).

Chromosome numbers. $2n = 14, 28$ (Lepper, 1979, 1980, 1982; Lammers, 1993).

Distribution. Thirty-eight species endemic to North America, in three discrete areas: (1) Greater Antilles: Cuba, Jamaica, Hispaniola, Isla de Mona, Puerto Rico (chromosome numbers: $2n = 14, 28$). Included species: *Lobelia acuminata* Sw., *L. alticaulis* Proctor, *L. assurgens* L., *L. cacuminis* Britton & P. Wilson, *L. caledoniana* C. D. Adams, *L. caudata* (Griseb.) Urb., *L. christii* Urb., *L. cubana* Urb., *L. fawcettii* Urb., *L. grandifolia* Britton, *L. harrisii* Urb., *L. hotteana* Judd & Skean, *L. imberbis* (Griseb.) Urb., *L. innominata* Rendle, *L. martagon* (Griseb.) Hitchc., *L. oxyphylla* Urb., *L. portoricensis* (Vatke) Urb., *L. robusta* Graham, *L. rotundifolia* Juss. ex A. DC., *L. salicina* Lam., *L. shaferi* Urb., *L. viridiflora* McVaugh, *L. vivaldii* Lammers & Proctor. (2) Lesser Antilles: St. Kitts, Nevis, Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, Grenada. Included species: *L. brigittalis* E. H. L. Krause, *L. cirsiifolia* Lam., *L. conglobata* Lam., *L. digitalifolia* (Griseb.) Urb., *L. kraussii* Graham, *L. persicifolia* Lam., *L. santa-luciae* Rendle, *L. stricta* Sw. (3) Southern Mexico to Panama. Included species: *L. calochlamys* (Donn. Sm.) Wilbur, *L. dressleri* Wilbur, *L. guatemalensis* (B. L. Rob. ex Donn. Sm.) Wilbur, *L. nubicola* McVaugh, *L. parvidentata* L. O. Williams, *L. tatea* (E. Wimm.) E. Wimm., *L. zelayensis* Wilbur.

Discussion. Wimmer (1943, 1953, 1968) assigned these species to two disparate taxa. Those with capsular fruit constituted the “§ species antillanae” of *Lobelia* subsect. *Primanae*, while those with indehiscent fruit were included among the members of *Pratia* sect. *Colensoa* (see above). Murata (1995) merely suggested in passing that these species “may be attributable to sect. *Homochilus*.” The molecular phylogeny of Antonelli (2008) largely supported the recognition of this taxon, as four exemplars belonged to one subclade within his clade 5. *Lobelia rotundifolia*, however, fell among the exemplars of *Lobelia* sect. *Lobelia* in another subclade of clade 5. It is of interest in this regard that McVaugh (1943) earlier assigned *L. rotundifolia* to *Lobelia* sect. *Lobelia* on the basis of its fenestrate corolla and inconspicuous basal bracteoles. The name of this section would be unaffected by the addition of the genus *Hippobroma* (cf. Antonelli, 2008).

Practical references. The members of the Mexican and Central American subgroup may be identified using the key provided by Wilbur (1991).

11. *Lobelia* sect. *Homochilus* A. DC., Prodr. (DC.) 7: 383. 1839. *Rapuntium* sect. *Homochilus* (A. DC.) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 369. 1995]: *Lobelia laxiflora* Kunth.

Plants perennial (hemicryptophytes or chamaephytes) or shrubs, (0.2–)0.5–3 m tall. Stems robust, herbaceous, suffruticose, or woody, ascending or erect, simple to branched. Leaves sessile or less often petiolate. Flowers solitary in the axils of the upper leaves or these reduced in size, creating a terminal raceme; pedicels ebracteolate or bibracteolate. Corolla bilabiate or sub-bilabiate (rarely unilabiate), magenta, purple, red, pink, orange, or yellow, concolorous or sharply bicolorous, 22–48(–56) mm; tube straight, laterally fenestrate or entire; lobes much shorter than the tube, spreading (rarely deflexed). Anthers bearded with tufts of filiform hairs at apex on the ventral pair. Fruit a capsule. Seeds ellipsoid or oblong, terete; testa striate (Murata type D).

Chromosome number. $2n = 14$ (Lammers, 1993).

Distribution. Endemic to the New World, with five species from southern Arizona to southwestern Colombia, and *Lobelia decurrens* endemic to Peru. Included species: *L. aguana* E. Wimm., *L. decurrens* Cav., *L. ghiesbreghtii* Decne., *L. guerrensis* Eakes & Lammers, *L. heteroclita* McVaugh, *L. laxiflora* Kunth.

Discussion. The circumscription used here is identical to that of Wimmer (1953, 1968), Murata (1995), and Lammers (2004), and is supported by the phylogeny of Antonelli (2008).

Practical references. A key to these species and complete descriptions are provided by Lammers (2004).

12. *Lobelia* sect. *Tupa* (G. Don) Benth., Gen. Pl. [Bentham & Hooker f.] 2: 552. 1876. *Tupa* G. Don, Gen. Hist. 3: 700. 1834. *Lobelia* [unranked] *Tupa* (G. Don) Heynh., Nomencl. Bot. Hort. 1: 473. 1840. *Rapuntium* sect. *Tupa* (G. Don) Kuntze, Lex. Gen. Phan. 478. 1903. *Lobelia* subg. *Tupa* (G. Don) E. Wimm., Ann.

Naturhist. Mus. Wien 56: 364. 1948. TYPE [sub Art. 22.6]: *Lobelia tupa* L.

Tupa sect. *Eutupa* A. DC., Prodr. (DC.) 7: 391. 1839, nom. invalid. sub Art. 21.3. *Lobelia* sect. *Eutupa* A. DC. ex E. Wimm., Ann. Naturhist. Mus. Wien 56: 365. 1948, nom. illeg. sub Art. 52.1. *Lobelia* subsect. *Primanae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 365. 1948. TYPE [sub Art. 22.6]: *Lobelia tupa* L.

Plants perennial (hemicryptophytes or chamaephytes) or shrubs (rarely trees), 0.5–4(–6.8) m tall. Stems robust, herbaceous, suffruticose, or woody, ascending or erect, simple to much branched; latex white, pale yellow, or tan. Leaves sessile. Flowers solitary in the axils of the upper leaves or these reduced in size, creating a terminal raceme; pedicels ebracteolate or bibracteolate. Corolla unilabiate, red, pink, or purple, rarely yellow, concolorous or subtly bicolorous, 15–65 mm; tube arcuate; lobes much shorter than the tube, deflexed, coherent at apex. Anthers bearded with tufts of filiform hairs at apex of ventral pair. Fruit a capsule. Seeds ovoid, ellipsoid, or oblong, terete; testa striate (Murata type D).

Chromosome number. $2n = 42$ (Lammers, 1993).

Distribution. Endemic to central Chile; four species. Included species: *Lobelia bridgesii* Hook. & Arn., *L. excelsa* Bonpl., *L. polyphylla* Hook. & Arn., *L. tupa* L.

Discussion. The narrow circumscription embraced here is identical to that of Murata (1995) and Lammers (2000), which finds strong support in the molecular phylogenies of Knox et al. (1993, 2008b), Knox and Palmer (1998), Koopman and Ayers (2005), and Antonelli (2008). Wimmer's (1953, 1968) circumscription of the section was much broader, encompassing the species here treated as *Lobelia* sect. *Speirema*, *Lobelia* sect. *Trimeris*, and *Lobelia* sect. *Tylomium*, as well as some of those in *Lobelia* sect. *Rhynchoptalum*. The circumscription used here is equivalent to the “§ species chilenses” within his *Lobelia* subsect. *Primanae*.

Practical references. A key to these species and complete descriptions are provided by Lammers (2000).

13. *Lobelia* sect. *Trimeris* (C. Presl) A. DC., Prodr. (DC.) 7: 357. 1839. *Trimeris* C. Presl, Prodr. Monogr. Lobel. 46. 1836. *Rapuntium* sect. *Trimeris* (C. Presl) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [sub Art. 37.3]: *Trimeris*

oblongifolia C. Presl [= *Lobelia scaevolifolia* Roxb.].

Shrubs, 1–2 m tall. Stems robust, woody, decumbent or ascending, branched. Leaves petiolate. Flowers solitary in the axils of the upper leaves; pedicels ebracteolate. Corolla sub-bilabiate, white, 12–15 mm; tube slightly curved; lobes as long as the tube or longer, spreading. Anthers bearded with tufts of filiform hairs at apex of ventral pair. Fruit a capsule. Seeds ovoid, terete; testa striate-reticulate (Murata type C).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Endemic to St. Helena; monotypic. Included species: *Lobelia scaevolifolia* Roxb.

Discussion. Wimmer (1953, 1968) included this species among the “§ Barbiferae–Longipedicellatae” within his *Lobelia* subsect. *Haynaldianae*. Murata (1995) did not include the species in *Lobelia*, presumably following Mabberley (1974), who accorded it generic rank.

Practical references. A detailed description of the sole species was provided by Mabberley (1974).

- 14. *Lobelia* sect. *Speirema*** (Hook. f. & Thomson) Lammers, J. Bot. Res. Inst. Texas 4: 161. 2010. *Speirema* Hook. f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 27. 1858. *Pratia* sect. *Speirema* (Hook. f. & Thomson) Baill., Hist. Pl. 8: 366. 1885. TYPE [sub Art. 37.3]: *Speirema montanum* (Reinw. ex Blume) Hook. f. & Thomson [= *Lobelia montana* Reinw. ex Blume].

Lobelia subsect. *Haynaldianae* E. Wimm., Ann. Naturhist. Mus. Wien 56: 366. 1948. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 358. 1995]: *Lobelia omeiensis* E. Wimm. [= *Lobelia fangiana* (E. Wimm.) S. Y. Hu]. [Although Mabberley (1974) earlier designated *Lobelia fistulosa* Vell., that species was not among those included in the protologue.]

Plants perennial (hemicryptophytes or chamaephytes) or shrubs, 0.3–2 m tall. Stems robust, herbaceous, suffrutescent, or woody, erect, arching, straggling, or sprawling, branched or unbranched. Leaves sessile or petiolate. Flowers solitary in the axils of little-reduced or unreduced leaves (rarely the uppermost aggregated into a terminal 10- to 25-flowered raceme); pedicels ebracteolate (rarely with a pair of linear bracteoles 6–18 mm long in the lower third). Corolla sub-bilabiate, greenish, bluish lilac,

red-purple, or dark violet, the lip often contrastingly striped or spotted, 12–26 mm; tube straight; lobes as long as the tube or longer, spreading. Ventral anthers bearded at apex with tufts of filiform hairs. Fruit a berry. Seeds cuboidal or quadrate, subterete or slightly compressed; testa striate-reticulate (Murata type C).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Endemic to southeastern Asia, from northeastern India and Tibet to northern Vietnam, with disjunct populations of *Lobelia montana* on the Malay Peninsula, Sumatra, and Java; five species. Included species: *L. brevisepala* (Y. S. Lian) Lammers, *L. fangiana* (E. Wimm.) S. Y. Hu, *L. longipedicellata* C. E. C. Fisch., *L. montana* Reinw. ex Blume, *L. reflexisepala* Lammers.

Discussion. The members of this section were assigned to *Lobelia* sect. *Colensoa* by Murata (1995) and (as *Pratia* sect. *Colensoa*) Wimmer (1943, 1953, 1968). As noted above, the species included in that section by these authors were quite heterogeneous, belonging to disparate lineages. None of the five assigned here have been included in a phylogenetic analysis as yet, but they do form a morphologically distinctive group on the basis of their solitary axillary flowers and indehiscent fruit.

- 15. *Lobelia* sect. *Plagiobotrys*** Lammers, J. Bot. Res. Inst. Texas 4: 172. 2010. TYPE: *Lobelia borneensis* (Hemsl.) Moeliono.

Plants perennial (hemicryptophytes or chamaephytes) or shrubs, 0.7–3 m tall. Stems robust, herbaceous or suffrutescent, branched, sprawling or scrambling. Leaves petiolate. Flowers in a terminal pedunculate bracteate raceme that appears axillary due to overtopping by a vegetative branch; pedicels bibracteolate below the middle. Corolla sub-bilabiate, white, purple or red-purple, red, or white, 10–28 mm; tube straight; lobes longer than the tube, reflexed. Anthers with tufts of flattened hairs at apex of all 5. Fruit a fleshy purple berry. Seeds cuboidal or quadrate; testa reticulate (Murata type B).

Chromosome number. Unknown (Lammers, 1993).

Distribution. Endemic to Malesia, on Borneo, Sulawesi, and Flores; monotypic. Included species: *Lobelia borneensis* (Hemsl.) Moeliono.

Etymology. From the Greek πλαγος (meaning “placed sideways”) and βοτρυς (meaning “a bunch of grapes”), in allusion to the pedunculate pseudoaxillary racemes of small purple berries.

Discussion. As with the preceding section, previous authors (Wimmer, 1943, 1953, 1968; Murata, 1995) assigned this species to *Lobelia* sect. *Colensoa*. It might be included in the preceding section on the basis of its baccate fruit, but differs conspicuously in its pseudoaxillary raceme, flattened trichomes at apex of all five anthers, and reticulate seed coat.

16. *Lobelia* sect. *Rhynchoptalum* (Fresen.) Benth., Gen. Pl. [Bentham & Hooker f.] 2: 552. 1876. *Rhynchoptalum* Fresen., Flora 21: 603. 1838. *Tupa* sect. *Rhynchoptalum* (Fresen.) A. Rich., Tent. Fl. Abyss. 2: 9. 1850. TYPE [sub Art. 37.3]: *Rhynchoptalum montanum* Fresen. [= *Lobelia rhynchoptalum* Hemsl.].

Haynaldia Kanitz, Magyar Növényt. Lapok 1: 3. 1877, nom. illeg. sub Art. 53.1, non *Haynaldia* Schur, Enum. Pl. Transsilv. 807. 1866, nec *Haynaldia* Schulzer, Verh. K.K. Zool.-Bot. Ges. Wien 16: 37. 1866. *Euhaynaldia* Borbás, Földmüv. Érdek. 8: 331. 1880. *Lobelia* sect. *Euhaynaldia* (Borbás) Zahlbr., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1895: 69. 1895. *Rapuntium* sect. *Haynaldia* Kuntze, Lex. Gen. Phan. 478. 1903, nom. illeg. sub Art. 52.1. TYPE [designated by Lammers, World Checkl. & Bibliogr. Campanulaceae: 348. 2007]: *Haynaldia exaltata* (Pohl) Kanitz [= *Lobelia exaltata* Pohl].

Lobelia ser. *Longisepalae* E. A. Bruce, Bull. Misc. Inform. Kew 1934: 63. 1934, as “*Longisepala*.” TYPE [sub Art. 22.6]: *Lobelia longisepala* Engl. [The orthography of this and the following four taxa have been corrected under Article 32.7 to comply with Article 21.2.]

Lobelia ser. *Mildbraediorum* E. A. Bruce, Bull. Misc. Inform. Kew 1934: 65. 1934, as “*Mildbraedii*.” TYPE [sub Art. 22.6]: *Lobelia mildbraedii* Engl.

Lobelia ser. *Giberroa* E. A. Bruce, Bull. Misc. Inform. Kew 1934: 65. 1934. TYPE [sub Art. 22.6]: *Lobelia giberroa* Hemsl.

Lobelia ser. *Deckeniorum* E. A. Bruce, Bull. Misc. Inform. Kew 1934: 65. 1934, as “*Deckenii*.” TYPE [sub Art. 22.6]: *Lobelia deckenii* (Asch.) Hemsl.

Lobelia ser. *Telekiorum* E. A. Bruce, Bull. Misc. Inform. Kew 1934: 65. 1934, as “*Telekii*.” TYPE [sub Art. 22.6]: *Lobelia telekii* Schweinf.

Lobelia [unranked] *Barbiferae* E. Wimm., Pflanzenr. IV, 276b: 633. 1953. TYPE [here designated]: *Lobelia organensis* Gardner.

Lobelia [unranked] *Longipedicellatae* E. Wimm., Pflanzenr. IV, 276b: 633. 1953. TYPE [here designated]: *Lobelia organensis* Gardner.

Lobelia [unranked] *Brevipedicellatae* E. Wimm., Pflanzenr. IV, 276b: 634. 1953. TYPE [here designated]: *Lobelia pyramidalis* Wall.

Lobelia [unranked] *Imberbes* E. Wimm., Pflanzenr. IV, 276b: 636. 1953. *Lobelia* subg. *Imberbes* (E. Wimm.)

T. Yamaz., Fl. Japan (Iwatzuki et al., eds.) 3a: 417. 1993. *Lobelia* sect. *Imberbes* (E. Wimm.) T. Yamaz., Fl. Japan (Iwatzuki et al., eds.) 3a: 417. 1993. TYPE [designated by T. Yamaz. in K. Iwatzuki et al., Fl. Japan 3a: 417. 1993]: *Lobelia boninensis* Koidz.

Lobelia subsect. *Nicotianifoliae* Mabb., Kew Bull. 29: 561. 1974. TYPE [designated by the author]: *Lobelia nicotianifolia* Roth ex Schult.

Lobelia subsect. *Rueppellianae* Mabb., Kew Bull. 29: 571. 1974. TYPE [designated by the author]: *Lobelia rhynchoptalum* Hemsl.

Plants perennial or pliestesial (hemicryptophytes, chamaephytes, or herbaceous phanerophytes), shrubs, treelets, or trees, 0.5–9 m tall. Stems robust, typically pachycaul, herbaceous, suffrutescent, or woody, prostrate, decumbent, ascending, or erect, simple, often apically rosulate. Leaves sessile (very rarely petiolate). Flowers in a terminal raceme or panicle; pedicels ebracteolate or bibracteolate. Corolla sub-bilabiate or unilabiate, various shades of blue, purple, red, yellow, green, or white, (12–)22–50 mm; tube curved or arcuate; lobes spreading or deflexed, as long as the tube or longer. Anthers bearded with tufts of filiform hairs at apex of ventral pair or all anthers nude at apex. Fruit a capsule. Seeds ovoid, lenticular, commonly winged; testa striate-reticulate (Murata type C).

Chromosome number. $2n = 28$ (Knox & Kowal, 1993; Lammers, 1993; Ruas et al., 2001).

Distribution. Almost pantropical, with 61 species in three disjunct areas: (1) Southern and eastern Asia: Sri Lanka and India to eastern China, the Bonin Islands, Taiwan, the Philippines, Vietnam, and Sumatra, with *Lobelia sessilifolia* extending north to eastern Siberia, the Russian Far East, the Kuril Islands, Korea, and Japan (chromosome number: $2n = 28$). Included species: *L. beddomeana* E. Wimm., *L. boninensis* Koidz., *L. clavata* E. Wimm., *L. colorata* Wall., *L. davidii* Franch., *L. doniana* Skottsb., *L. erectiuscula* H. Hara, *L. eryliae* C. E. C. Fisch., *L. foliiformis* T. J. Zhang & D. Y. Hong, *L. iteophylla* C. Y. Wu, *L. leschenaultiana* (C. Presl) Skottsb., *L. melliana* E. Wimm., *L. mishmica* C. B. Clarke, *L. nicotianifolia* Roth ex Schult., *L. nubigena* J. Anthony, *L. philippinensis* Skottsb., *L. pleotricha* Diels, *L. proctorii* Argent & P. Wilkie, *L. pyramidalis* Wall., *L. rosea* Wall., *L. seguinii* H. Lév. & Vaniot, *L. sessilifolia* Lamb., *L. sumatrana* Merr., *L. tibetica* W. L. Zheng. (2) Tropical Africa: Ethiopia to Transvaal and Angola, west to the Gulf of Guinea (chromosome number: $2n = 28$). Included species: *L. aberdarica* R. E. Fr. & T. C. E. Fr., *L. acrochilus* (E. Wimm.) E. B. Knox, *L. bambusetii* R. E. Fr. & T. C. E. Fr., *L. barnsii* Exell, *L. bequaertii* De Wild.,

L. burtii E. A. Bruce, *L. columnaris* Hook. f., *L. deckenii* (Asch.) Hemsl., *L. giberroa* Hemsl., *L. gregoriana* Baker f., *L. longisepala* Engl., *L. lukwangulensis* Engl., *L. mildbraedii* Engl., *L. morogoroensis* Knox & Pócs, *L. petiolata* Hauman, *L. rhynchopetalum* Hemsl., *L. ritabeaniana* E. B. Knox, *L. sancta* Thulin, *L. stricklandiae* Gilliland, *L. stuhlmannii* Schweinf. ex Stuhlmann, *L. telekii* Schweinf., *L. thuliniana* E. B. Knox, *L. udzungwensis* Thulin, *L. wollastonii* Baker f., *L. xongorolana* E. Wimm. (3) South America: southeastern Brazil, with *L. hassleri* extending into adjacent Argentina and Paraguay (chromosome number: $2n = 28$). Included species: *L. brasiliensis* A. O. S. Vieira & G. J. Sheph., *L. exaltata* Pohl, *L. fistulosa* Vell., *L. glazioviana* Zahlbr., *L. hassleri* Zahlbr., *L. hilaireana* (Kanitz) E. Wimm., *L. imperialis* E. Wimm., *L. langeana* Dusén, *L. organensis* Gardner, *L. santos-limae* Brade, *L. stellfeldii* R. Braga, *L. thapsoidea* Schott ex Pohl.

Discussion. This section is circumscribed more broadly than it was by Wimmer (1953, 1968) and Murata (1995), as it also encompasses species that the former assigned to *Lobelia* subsect. *Haynaldianae* and that the latter assigned to *Lobelia* sect. *Colensoa*. The monophyly of the section as here circumscribed is supported by the results of molecular phylogenies (Knox et al., 1993, 2006; Knox & Palmer, 1998; Antonelli, 2008).

Practical references. A key and detailed descriptions of the African representatives of the section were provided by Mabberley (1974, 1975a, 1975b).

17. *Lobelia* sect. *Revolutella* E. Wimm., Ann. Naturhist. Mus. Wien 56: 369. 1948. *Neowimmeria* O. Deg. & I. Deg., Phytologia 12: 73. 1965. TYPE [designated by O. Degener & I. Degener, Phytologia 12: 73. 1965]: *Lobelia grayana* E. Wimm.

Shrubs, 0.2–0.7 m tall, and treelets, 0.5–6 m tall. Stems robust, woody, prostrate or decumbent and branched (shrubs), ascending or erect and simple (treelets), sometimes apically rosulate. Leaves sessile (petiolate in extinct *Lobelia remyi* Rock). Flowers in a terminal raceme or panicle; pedicels bibracteolate near base. Corolla bilabiate, blue (treelets) or magenta (shrubs), 15–45 mm; tube straight or slightly curved; lobes as long as the tube or longer, tightly recoiled. Anthers bearded with tufts of filiform hairs at apex of ventral pair. Fruit a capsule. Seeds ellipsoid, terete; testa striate-reticulate (Murata type C).

Chromosome number. $2n = 28$ (Lammers, 1993).

Distribution. Endemic to the Hawaiian Islands, from Ni'ihau to Hawai'i; nine species. Included species: *Lobelia dunbariae* Rock, *L. grayana* E. Wimm., *L. hillebrandii* Rock, *L. hypoleuca* Hillebr., *L. monostachya* (Rock) Lammers, *L. niuhauensis* H. St. John, *L. oahuensis* Rock, *L. remyi* Rock, *L. yuccoides* Hillebr.

Discussion. The circumscription used here is identical to that of Wimmer (1953, 1968), Degener and Degener (1974), Murata (1995), and Lammers (1990). Monophyly is supported by the molecular analyses of Antonelli (2008) and Givnish et al. (2009).

Practical references. A key to these species and brief descriptions are provided by Lammers (1990).

18. *Lobelia* sect. *Galeatella* E. Wimm., Ann. Naturhist. Mus. Wien 56: 369. 1948. *Galeatella* (E. Wimm.) O. Deg. & I. Deg., Fl. Hawaiiensis, fam. 339. 1962. TYPE [designated by O. Degener & I. Degener, Fl. Hawaiiensis, fam. 339. 1962]: *Lobelia villosa* (Rock) H. St. John & Hosaka.

Treelets, 0.7–5 m tall. Stems pachycaul, woody, ascending or erect, simple, apically rosulate. Leaves sessile; margin entire. Flowers in a terminal raceme or panicle; pedicels ebracteolate. Corolla bilabiate, pale purple, red, yellow, or white, 44–103 mm; tube straight or slightly curved; lobes as long as the tube or longer, spreading. Anthers bearded with tufts of filiform hairs at apex of all 5. Fruit a capsule. Seeds oblong, lenticular, winged; testa striate-reticulate (Murata type C).

Chromosome number. Unknown (Lammers, 1993, 2007b).

Distribution. Endemic to the Hawaiian Islands, on Kaua'i, O'ahu, Moloka'i, and Maui; five species. Included species: *Lobelia gaudichaudii* A. DC., *L. gloria-montis* Rock, *L. koolauensis* (Hosaka & Fosberg) Lammers, *L. villosa* (Rock) H. St. John & Hosaka, *L. wahiawa* Lammers.

Discussion. As with the preceding section, the circumscription used here is identical to that of Wimmer (1953, 1968), Degener and Degener (1974), Murata (1995), and Lammers (1990, 2007b). Monophyly is supported by the molecular analysis of Givnish et al. (2009). If it were to prove desirable to subsume *Trematolobelia* Zahlbr. ex Rock into this section (cf. Lammers, 2007b; Givnish et al., 2009), a

new combination based on *Rapuntium* sect. *Trematocarpus* would have priority (see below).

Practical references. A key to these species and complete descriptions are provided by Lammers (2007b).

EXCLUDED NAMES

Listed here are all remaining infrageneric names that were effectively published under *Lobelia*, its later homonyms, or its homotypic synonyms. The currently accepted taxon to which the name pertains appears in brackets. Further information on typification of generic epithets serving as basionyms is provided by Lammers (2007a); and of sections of *Scaevola* (Goodeniaceae) by Carolin (1992).

Laurentia [unranked] *Hippobroma* (G. Don) Endl., Gen. Pl. 512. 1838. TYPE [sub Art. 7.4]: *Hippobroma longiflora* (L.) G. Don [= *Hippobroma* G. Don, Gen. Hist. 3: 17. 1834].

Laurentia sect. *Isotoma* (R. Br.) E. Wimm., Ann. Naturhist. Mus. Wien 56: 335. 1948. TYPE [sub Art. 7.4]: *Lobelia hypocrateriformis* R. Br. [= *Isotoma* (R. Br.) Lindl., Bot. Reg. 12: pl. 964. 1826].

Laurentia subg. *Isotoma* (R. Br.) Peterm., Pflanzenreich 444. 1845. TYPE [sub Art. 7.4]: *Lobelia hypocrateriformis* R. Br. [= *Isotoma* (R. Br.) Lindl., Bot. Reg. 12: pl. 964. 1826].

Laurentia [unranked] *Isotoma* (R. Br.) Endl., Gen. Pl. 512. 1838. TYPE [sub Art. 7.4]: *Lobelia hypocrateriformis* R. Br. [= *Isotoma* (R. Br.) Lindl., Bot. Reg. 12: pl. 964. 1826].

Laurentia sect. *Palmerella* (A. Gray) E. Wimm., Ann. Naturhist. Mus. Wien 56: 335. 1948. TYPE [sub Art. 7.4]: *Palmerella debilis* A. Gray [= *Palmerella* A. Gray, Proc. Amer. Acad. Arts 11: 80. 1876].

Laurentia subg. *Solenopsis* (C. Presl) Peterm., Pflanzenreich 444. 1845. TYPE [sub Art. 7.4]: *Lobelia minuta* L. [= *Solenopsis* C. Presl, Prodr. Monogr. Lobel. 32. 1836].

Laurentia [unranked] *Solenopsis* (C. Presl) Endl., Gen. Pl. 512. 1838. TYPE [Art. 7.4]: *Lobelia minuta* L. [= *Solenopsis* C. Presl, Prodr. Monogr. Lobel. 32. 1836].

Lobelia Mill., Gard. Dict. Abr., ed. 4. 1754, nom. illeg. sub Art. 53.1. TYPE [sub Art. 37.3]: *Lobelia frutescens* Mill. [= *Scaevola* L., Mant. Pl. 2: 145. 1771, nom. cons.].

Lobelia C. Presl, Prodr. Monogr. Lobel. 33. 1836, nom. illeg. sub Art. 53.1. TYPE [designated by Lammers, World Checkl. & Bibliogr. Campanulaceae: 348. 2007]: *Lobelia westiniana* Thunb. [= *Siphocampylus* Pohl, Pl. Bras. Icon. Descr. 2: 104. 1831].

Lobelia [unranked] *Centropogon* (C. Presl) Heynh., Nomencl. Bot. Hort. 1: 470. 1840. TYPE [sub Art. 7.4]: *Lobelia surinamensis* L. [= *Centropogon* C. Presl, Prodr. Monogr. Lobel. 48. 1836].

Lobelia sect. *Crossostoma* (G. Don) Kuntze, Lex. Gen. Phan. 335. 1903. TYPE [sub Art. 7.4]: *Scaevola spinescens* R. Br. [= *Scaevola* L. sect. *Scaevola*].

Lobelia [unranked] *Dobrowskya* (C. Presl) Heynh., Nomencl. Bot. Hort. 1: 470. 1840, as “*Dobrowskia*.” TYPE [sub Art. 7.4]: *Lobelia unidentata* W. T. Aiton [= *Monopsis*

sect. *Dobrowskya* (C. Presl) Urb., Jahrb. Königl. Bot. Gart. Berlin 1: 271. 1881].

Lobelia sect. *Enantiophyllum* (Miq.) Kuntze, Lex. Gen. Phan. 335. 1903. TYPE [sub Art. 7.4]: *Scaevola amboinensis* Miq. [= *Scaevola* sect. *Enantiophyllum* Miq., Ann. Mus. Bot. Lugduno-Batavum 1: 210. 1864].

Lobelia sect. *Eumezleria* E. Wimm., Pflanzenr. IV, 276b: 602. 1953. TYPE [designated by J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 15: 357. 1995]: *Lobelia depressa* L. f. [= *Monopsis* Salisb. sect. *Monopsis*].

Lobelia [unranked] *Isotoma* R. Br., Prodr. 565. 1810. TYPE [sub Art. 37.3]: *Lobelia hypocrateriformis* R. Br. [= *Isotoma* (R. Br.) Lindl., Bot. Reg. 12: pl. 964. 1826].

Lobelia [unranked] *Laurentia* Heynh., Nomencl. Bot. Hort. 1: 470. 1840. TYPE [sub Art. 7.4]: *Lobelia minuta* L. [= *Solenopsis* C. Presl, Prodr. Monogr. Lobel. 32. 1836].

Lobelia sect. *Mezleria* (C. Presl) Schönk., Nat. Pflanzenfam. [Engler & Prantl] IV(5): 67. 1889. TYPE [sub Art. 7.4]: *Lobelia depressa* L. f. [= *Monopsis* Salisb. sect. *Monopsis*].

Lobelia subg. *Mezleria* (C. Presl) E. Wimm., Ann. Naturhist. Mus. Wien 56: 364. 1948. TYPE [sub Art. 7.4]: *Lobelia depressa* L. f. [= *Monopsis* Salisb. sect. *Monopsis*].

Lobelia [unranked] *Monopsis* (Salisb.) Heynh., Nomencl. Bot. Hort. 1: 473. 1840. TYPE [sub Art. 7.4]: *Lobelia speculum* Andrews [= *Monopsis* Salisb., Trans. Hort. Soc. London 2: 37. 1817].

Lobelia sect. *Palmerella* (A. Gray) McVaugh, Amer. Midl. Naturalist 24: 682. 1940. TYPE [sub Art. 7.4]: *Palmerella debilis* A. Gray [= *Palmerella* A. Gray, Proc. Amer. Acad. Arts 11: 80. 1876].

Lobelia [unranked] *Parastranthus* (G. Don) Heynh., Nomencl. Bot. Hort. 1: 473. 1840. TYPE [sub Art. 7.4]: *Lobelia lutea* L. [= *Monopsis* sect. *Xanthomeria* (C. Presl) Lammers].

Lobelia sect. *Pogonanthera* (G. Don) Kuntze, Lex. Gen. Phan. 335. 1903. TYPE [sub Art. 7.4]: *Scaevola striata* R. Br. [= *Scaevola* subsect. *Pogonanthera* (G. Don) Carolin, Telopea 3: 490. 1990].

Lobelia [unranked] *Siphocampylus* (Pohl) Heynh., Nomencl. Bot. Hort. 1: 473. 1840. TYPE [sub Art. 7.4]: *Siphocampylus westinianus* (Thunb.) Pohl [= *Siphocampylus* Pohl, Pl. Bras. Icon. Descr. 2: 104. 1831].

Laurentia subg. *Solenanthis* (Kunth) Peterm., Pflanzenreich 444. 1845. TYPE [sub Art. 7.4]: *Lobelia longiflora* L. [= *Hippobroma* G. Don, Gen. Hist. 3: 717. 1834].

Lobelia [unranked] *Solenanthis* Kunth, Nov. Gen. Sp. [H.B.K.] 3: 309 (quarto), 241 (folio). 1819. TYPE [sub Art. 37.3]: *Lobelia longiflora* L. [= *Hippobroma* G. Don, Gen. Hist. 3: 717. 1834].

Lobelia sect. *Takkada* Kuntze, Lex. Gen. Phan. 335. 1903, nom. invalid. sub Art. 22.2. [= *Scaevola* L. sect. *Scaevola*].

Lobelia [unranked] *Xanthomeria* (C. Presl) Endl., Gen. Pl. 512. 1838. TYPE [sub Art. 7.4]: *Rapuntium luteum* (L.) C. Presl [= *Monopsis* sect. *Xanthomeria* (C. Presl) Lammers].

Lobelia sect. *Xerocarpa* (G. Don) Kuntze, Lex. Gen. Phan. 335. 1903. TYPE [sub Art. 7.4]: *Scaevola crassifolia* Labill. [= *Scaevola* sect. *Xerocarpa* G. Don, Gen. Hist. 3: 730. 1834].

Rapuntium sect. *Grammatotheca* (C. Presl) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [sub Art. 7.4]: *Clintonia*

- bergiana* (Cham.) G. Don [= *Grammatotheca* C. Presl, Prodr. Monogr. Lobel. 43. 1836].
- Rapuntium* sect. *Mezleria* (C. Presl) Kuntze, Lex. Gen. Phan. 477. 1903, as “*Metzleria*.” TYPE [sub Art. 7.4]: *Lobelia depressa* L. f. [= *Monopsis* Salisb. sect. *Monopsis*].
- Rapuntium* sect. *Monopsis* (Salisb.) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [sub Art. 7.4]: *Lobelia speculum* Andrews [= *Monopsis* Salisb., Trans. Hort. Soc. London 2: 37. 1817].
- Rapuntium* sect. *Parastranthus* (G. Don.) Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [sub Art. 7.4]: *Lobelia lutea* L. [= *Monopsis* sect. *Xanthomeria* (C. Presl) Lammers].
- Rapuntium* sect. *Trematocarpus* Kuntze, Lex. Gen. Phan. 478. 1903. TYPE [sub Art. 7.4]: *Trematocarpus macrostachys* (Hook. & Arn.) Zahlbr. [= *Trematolobelia* Zahlbr. ex Rock, Bull. Coll. Hawaii Publ. 2: 45. 1913].
- Rapuntium* sect. *Xanthomeria* C. Presl, Prodr. Monogr. Lobel. 11. 1836. TYPE [here designated]: *Rapuntium luteum* (L.) C. Presl [= *Monopsis* sect. *Xanthomeria* (C. Presl) Lammers, comb. nov.].

This combination is effected here to provide the correct name for the taxon that Wimmer (1953, 1968) called *Monopsis* sect. *Parastranthus* (G. Don) E. Wimm. (cf. Lammers, 2007a, 2007c).

ADDENDUM

Since this paper was submitted, three papers have appeared that change somewhat certain aspects described here:

- Lammers, T. G. 2010. Revision of *Lobelia* sect. *Speirema* (Campanulaceae: Lobelioideae). J. Bot. Res. Inst. Texas. 4: 159–168.

This section now contains just four species. *Lobelia brevisepala* and *L. reflexisepala* are now included within the circumscription of *L. montana*, while *L. deleiensis* C. E. C. Fisch. (formerly placed there) is now recognized. The article includes a key to species and subspecies and full descriptions.

- Lammers, T. G. 2010. Revision of *Lobelia* sect. *Plagiobotrys* (Campanulaceae: Lobelioideae). J. Bot. Res. Inst. Texas. 4: 169–180.

Lobelia origenes Lammers, newly described from Borneo, was added to this section. The article includes a key to species and subspecies and full descriptions.

- Lammers, T. G. 2011. Revision of the Malesian species of *Lobelia* sect. *Rhynchoptalum* (Campanulaceae: Lobelioideae). Blumea. 56: in press.

Lobelia sulawesiensis Lammers, newly described from Sulawesi, was added to this section. The article includes a key to species and subspecies and full descriptions.

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APPENDIX 1. Index to sectional assignments.

This is an index to all species included within *Lobelia* by Lammers (2007a), plus those added to the genus subsequently (Argent et al., 2007; Lammers, 2007b; Heenan et al., 2008; Knox et al., 2008a; Senterre & Castillo-Campos, 2008). It will permit one to determine the section (denoted parenthetically by its number as given in the following list) to which a species of *Lobelia* was assigned in the discussion above. Names in the literature that do not appear in this index may be sought in the synonymy lists of Lammers (2007a) to determine the species to which it is currently assigned.

1. *Lobelia* sect. *Delostemon*
2. *Lobelia* sect. *Holopogon*
3. *Lobelia* sect. *Colensoa*
4. *Lobelia* sect. *Cryptostemon*
5. *Lobelia* sect. *Stenotium*
6. *Lobelia* sect. *Lobelia*
7. *Lobelia* sect. *Hypsela*
8. *Lobelia* sect. *Mezleriopsis*
9. *Lobelia* sect. *Jasionopsis*
10. *Lobelia* sect. *Tylomium*
11. *Lobelia* sect. *Homochilus*
12. *Lobelia* sect. *Tupa*
13. *Lobelia* sect. *Trimeris*
14. *Lobelia* sect. *Speirema*
15. *Lobelia* sect. *Plagiobotrys*
16. *Lobelia* sect. *Rhynchoptalum*
17. *Lobelia* sect. *Revolutella*
18. *Lobelia* sect. *Galeatella*

L. aberdarica (16), *L. acrochilus* (16), *L. acuminata* (10), *L. acutidens* (5), *L. adnexa* (5), *L. agrestis* (5), *L. aguana* (11), *L. alsinoides* (1), *L. alticaulis* (10), *L. amoena* (6), *L. anatina* (5), *L. anceps* (5), *L. andrewsii* (2), *L. angulata* (7), *L. appendiculata* (6), *L. aquaemontis* (5), *L. aquatica* (1), *L. archboldiana* (7), *L. ardisiandroides* (1), *L. arenaria* (7), *L. arnhemiaca* (7), *L. assurgens* (10), *L. aurita* (5), *L. australiensis* (7).

L. bambusetii (16), *L. barkerae* (1), *L. barnsii* (16), *L. baumannii* (1), *L. beaugleholei* (7), *L. beddomeana* (16), *L. benthamii* (7), *L. bequaertii* (16), *L. berlandieri* (5), *L. blantyrensis* (1), *L. boivinii* (5), *L. boninensis* (16), *L. borneensis* (15), *L. boykinii* (6), *L. brachyantha* (7), *L. brasiliensis* (16), *L. brevifolia* (6), *L. brevisepala* (14), *L. bridgesii* (12), *L. brigittalis* (10), *L. burtii* (16).

L. cacuminis (10), *L. caeciliae* (5), *L. caerulea* (1), *L. caledoniana* (10), *L. calochlamys* (10), *L. camporum* (5), *L. canbyi* (6), *L. capillifolia* (1), *L. cardinalis* (6), *L. carens* (7), *L. caudata* (10), *L. chamaedryifolia* (1), *L. chamaepitys* (1), *L. cheranganiensis* (5), *L. chevalieri* (1), *L. chinensis* (7), *L. chirensis* (5), *L. christii* (10), *L. circaeoides* (5), *L. cirsiifolia* (10), *L. clavata* (16), *L. cliffortiana* (5), *L. cobaltica* (1), *L. cochlearifolia* (1), *L. collina* (5), *L. colorata* (16), *L. columnaris* (16), *L. comosa* (5), *L. comptonii* (1), *L. concolor* (7), *L. conferta* (7), *L. conglobata* (10), *L. cordifolia* (5), *L. corniculata* (1), *L. coronopifolia* (1), *L. cubana* (10), *L. cuneifolia* (5), *L. cyanea* (5), *L. cymbalarioides* (5), *L. cyphioides* (5).

L. darlingensis (7), *L. dasyphylla* (1), *L. davidii* (16), *L. deckenii* (16), *L. decurrens* (11), *L. decurrentifolia* (1), *L. dentata* (2), *L. diastateoides* (5), *L. diazluae* (5), *L. dichroma* (1), *L. dielsiana* (5), *L. digitalifolia* (10), *L. dioica* (7), *L. dissecta* (5), *L. divaricata* (5), *L. djurensis* (1), *L. dodiana* (8), *L. donanensis* (7), *L. doniana* (16), *L. dortmanna* (6), *L. dregeana* (5), *L. dressleri* (10), *L. dunbariae* (17), *L. duriprati* (5).

L. ehrenbergii (5), *L. elongata* (6), *L. endlichii* (5), *L. erectiuscula* (16), *L. erinus* (5), *L. erlangeriana* (5), *L. eryliae* (16), *L. euryopoda* (1), *L. exaltata* (16), *L. excelsa* (12), *L. exilis* (5).

L. fangiana (14), *L. fastigiata* (5), *L. fawcettii* (10), *L. feayana* (6), *L. fenestralis* (4), *L. fervens* (5), *L. filicaulis* (8), *L. filiformis* (5), *L. filipes* (5), *L. fistulosa* (16), *L. flaccida* (5), *L. flaccidifolia* (6), *L. flexicaulis* (5), *L. flexuosa* (5), *L. floridana* (6), *L. foliiformis* (16), *L. fugax* (7).

L. galpinii (5), *L. gattingeri* (6), *L. gaudichaudii* (18), *L. gelida* (7), *L. georgiana* (6), *L. ghiesbreghtii* (11), *L. gibbosa* (2), *L. giberroa* (16), *L. gilgii* (5), *L. gillettii* (5), *L. glaberrima* (7), *L. gladiaria* (5), *L. glandulosa* (6), *L. glaucescens* (5), *L. glazioviana* (16), *L. gloria-montis* (18), *L. goetzei* (1), *L. goldmanii* (5), *L. gouldii* (2), *L. gracillima* (5), *L. grandifolia* (10), *L. graniticola* (5), *L. grayana* (17), *L. gregoriana* (16), *L. griffithii* (1), *L. gruina* (5), *L. guatemalensis* (10), *L. guerrenensis* (11), *L. gypsophila* (5).

L. hainanensis (5), *L. harrisii* (10), *L. hartlaubii* (1), *L. hartwegii* (4), *L. hassleri* (16), *L. hederacea* (7), *L. henodon* (5), *L. henricksonii* (5), *L. hereroensis* (5), *L. heteroclita* (11), *L. heterophylla* (2), *L. heyneana* (5), *L. hilaireana* (16), *L. hillebrandii* (17), *L. hintoniorum* (5), *L. hirtipes* (5), *L. holotricha* (4), *L. holstii* (1), *L. homophylla* (5), *L. horombensis* (5), *L. hotteana* (10), *L. humistrata* (7), *L. humpatensis* (1), *L. hypnodes* (5), *L. hypoleuca* (17), *L. hypsibata* (5).

L. illota (5), *L. imberbis* (10), *L. imperialis* (16), *L. inconspicua* (5), *L. inflata* (6), *L. innominata* (10), *L. intercedens* (5), *L. ionantha* (7), *L. irasuensis* (4), *L. irrigua* (7), *L. iteophylla* (16).

L. jaliscensis (4), *L. jasionoides* (9).

L. kalmii (6), *L. kalobaensis* (5), *L. kirkii* (5), *L. knoblochii* (5), *L. koolauensis* (18), *L. kraussii* (10), *L. kundelungensis* (5).

L. langeana (16), *L. lasiocalycina* (5), *L. laurentioides* (5), *L. laxa* (5), *L. laxiflora* (11), *L. leichhardii* (2), *L. lepida* (5), *L. leschenaultiana* (16), *L. leucotos* (7), *L. limosa* (8), *L. linarioides* (5), *L. lindblomii* (5), *L. linearis* (1), *L. lingulata* (5), *L. linnaeoides* (7), *L. lisowskii* (5), *L. lithophila* (5), *L. livingstoniana* (5), *L. lobata* (5), *L. longicaulis* (5), *L. longipedicellata* (14), *L. longisepala* (16), *L. loochooensis* (7), *L. lucayana* (5), *L. lukwangulensis* (16), *L. luruniensis* (5), *L. luzoniensis* (5).

L. macdonaldii (4), *L. macraeana* (1), *L. macrocentron* (5), *L. macrodon* (7), *L. malowensis* (1), *L. margarita* (5), *L. martagon* (10), *L. mcvaughii* (5), *L. melliana* (16), *L. membranacea* (7), *L. mexicana* (5), *L. mezlerioides* (7), *L. microcarpa* (1), *L. mildbraedii* (16), *L. minutula* (5), *L. mishmica* (16), *L. modesta* (5), *L. molleri* (5), *L. monostachya* (17), *L. montana* (14), *L. morogoroensis* (16), *L. muscoides* (5).

L. nana (5), *L. neglecta* (1), *L. neumannii* (5), *L. nicotianifolia* (16), *L. niihauensis* (17), *L. nubicola* (10), *L. nubigena* (16), *L. nugax* (8), *L. nummularia* (7), *L. nummularioides* (1), *L. nuttallii* (6).

L. oahuensis (17), *L. obconica* (5), *L. occidentalis* (5), *L. oligophylla* (7), *L. oreas* (5), *L. organensis* (16), *L. orientalis* (5), *L. ovina* (1), *L. oxyphylla* (10).

L. paludigena (5), *L. paludosa* (6), *L. paranaensis* (5), *L. parva* (5), *L. parvidentata* (10), *L. parvisepala* (5), *L. patula* (1), *L. pedunculata* (7), *L. pentheri* (5), *L. perpusilla* (7), *L. perrieri* (5), *L. persicifolia* (10), *L. petiolata* (16), *L. philippinensis* (16), *L. physaloides* (3), *L. pinifolia* (1), *L. platycalyx* (7), *L. pleotricha* (16), *L. poetica* (4), *L. polyphylla* (12), *L. porphyrea* (5), *L. portoricensis* (10), *L. pratiana* (7), *L. pratioides* (7), *L. preslii* (1), *L. pringlei* (5), *L. proctorii* (16), *L. psilostoma* (2), *L. pteropoda* (1), *L. puberula* (6), *L. pubescens* (5), *L. pulchella* (5), *L. purpurascens* (7), *L. purpusii* (5), *L. pyramidalis* (16).

L. quadrangularis (7), *L. quadrisepala* (8), *L. quarreana* (5).

L. rarifolia (2), *L. reflexisepala* (14), *L. reinekeana* (5), *L. remyi* (17), *L. reniformis* (7), *L. reverchonii* (6), *L. rhombifolia* (2), *L. rhynchopetalum* (16), *L. rhytidosperma* (2), *L. ritabeaniana* (16), *L. rivalis* (5), *L. robusta* (10), *L. rosea* (16), *L. rotundifolia* (10), *L. roughii* (7), *L. rubescens* (5).

L. salicina (10), *L. sancta* (16), *L. santa-luciae* (10), *L. santos-limae* (16), *L. sapinii* (5), *L. sartorii* (5), *L. scaevolifolia* (13), *L. scebelii* (5), *L. schimperi* (5), *L. scrobiculata* (5), *L. seguinii* (16), *L. serpens* (5), *L. sessilifolia* (16), *L. setacea* (1), *L. shaferi* (10), *L. simplicicaulis* (2), *L. sinaloae* (4), *L. siphilitica* (6), *L. solaris* (5), *L. sonderiana* (8), *L. spathopetala* (5), *L. spicata* (6), *L. standleyi* (5), *L. stellfeldii* (16), *L. stenocarpa* (1), *L. stenodonta* (5), *L. stenophylla* (7), *L. stenosiphon* (5), *L. stolonifera* (5), *L. stricklandiae* (16), *L. stricta* (10), *L. stuhlmannii* (16), *L. sublibera* (5), *L. subnuda* (5), *L. subpubera* (5), *L. sumatrana* (16), *L. surrepens* (7), *L. sutherlandii* (5).

L. tarsophora (5), *L. tatea* (10), *L. telekii* (16), *L. telephioides* (5), *L. tenera* (5), *L. tenuior* (2), *L. terminalis* (1), *L. thapsoidea* (16), *L. thermalis* (1), *L. thuliniana* (16), *L. tibetica* (16), *L. tomentosa* (1), *L. trigonocaulis* (2), *L. tripartita* (5), *L. trullifolia* (5), *L. tupa* (12).

L. udzungwensis (16), *L. uliginosa* (5), *L. umbellifera* (4), *L. urens* (5).

L. vagans (5), *L. valida* (5), *L. vanreenensis* (1), *L. victoriensis* (7), *L. villaregalis* (5), *L. villosa* (18), *L. viridiflora* (10), *L. vivaldii* (10), *L. volcanica* (5).

L. wahiawa (18), *L. welwitschii* (5), *L. wilmsiana* (5), *L. winifrediae* (2), *L. wollastonii* (16).

L. xalapensis (5), *L. xongorolana* (16).

L. yucatana (5), *L. yuccoides* (17).

L. zelayensis (10), *L. zeylanica* (1), *L. zwartkopensis* (8).